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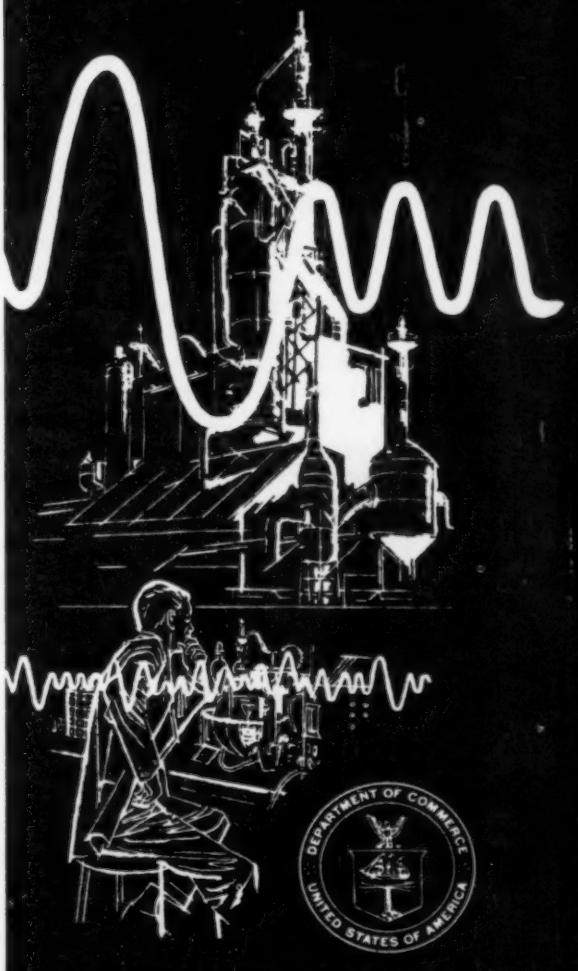

U. S. DEPARTMENT OF COMMERCE

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U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
John C. Green, *Director*

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AD-285 178 DIV. 15

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***CRYSTAL OVENS**

METHODS FOR PRECISION TEMPERATURE CONTROL. INVESTIGATION CONTINUED OF METHODS AND DEVICES BY WHICH TEMPERATURE OF A SINGLE QUARTZ CRYSTAL BLANK CAN BE MAINTAINED AT 85 C IN ENVIRONMENTAL TEMPERATURES RANGING FROM 80 TO -55 C. TWO TYPES OF CRYSTAL OVENS WERE STUDIED: ONE REQUIRING AN AVERAGE POWER INPUT OF 50 MW AT -55 C AND THE OTHER REQUIRING AN AVERAGE OF LESS THAN 500 MW. THESE ARE WITH INACCESSIBLE AND ACCESSIBLE
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***CRYSTALS**

SOME VARIATIONAL PRINCIPLES IN ANISOTROPIC AND NONHOMOGENEOUS ELASTICITY. A VARIATIONAL APPROACH TO THE THEORY OF THE ELASTIC BEHAVIOR OF POLYCRYSTALS.
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INTERACTION OF IR RADIATION WITH IONIC CRYSTALS: DEPENDENCE OF THE RADIATION OF THIN FILMS OF LIF ON PARTICLE SIZE: RADIATION IN THE 15 TO 38 MICRON REGION.
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AD-285 389 DIV. 25

BRIEF DISCUSSION OF RESEARCH PUBLICATIONS ON CDS AND CDSE. NO EXPERIMENTAL DATA ARE PRESENTED.
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AD-285 510 DIV. 25

***CUTTING TOOLS**

EFFECT OF FLANK WEAR ON TOOL TEMPERATURES AND TOOL FORCES IN THE MACHINING OF HEAT TREATED STEEL. IT WAS CONCLUDED THAT THE WIDE DIFFERENCE IN THE RIGIDITY OF THE TOOL-WORK AND TOOL-CHIP PAIR PLAYS AN IMPORTANT ROLE IN WEAR MECHANISM.
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***CYANIDES**

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***CYLINDRICAL BODIES**

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STRESS-STRAIN CHARACTERISTICS OF SHELLS AND HIGH EXPLOSIVES.
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STRESS-STRAIN CHARACTERISTICS OF SHELLS AND HIGH EXPLOSIVES.
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***DATA PROCESSING SYSTEMS**

PROCEDURE FOR PROCESSING OCEANOGRAPHIC STATION DATA USING AUTOMATIC DATA PROCESSING EQUIPMENT PROVIDES A RAPID METHOD OF TRACKING UNDERWATER TEST VEHICLES.
AD-284 980 DIV. 30

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AD-285 036 DIV. 5

MODERN CRYSTALLOGRAPHY. THIS RESEARCH IS CONCERNED WITH COLLECTION OF ALL PHYSICAL AND CHEMICAL DATA OR SOLIDS AND THE COLLATION AND ANALYSIS OF THESE DATA FOR USE IN SOLID STATE RESEARCH.
AD-285 510 DIV. 25

A THESAURUS OF THE NAMES OF ELECTRONIC DIGITAL COMPUTERS AND DATA PROCESSORS IS PRESENTED.
AD-285 567 DIV. 30

***DATA PROCESSING SYSTEMS**
DESIGN

CONTINUING RESEARCH ON INFORMATION PROCESSING, INCLUDING DIGITAL COMPUTERS, DATA PROCESSING COMPONENTS SPEECH RECOGNITION AND LANGUAGE PROCESSING.
AD-285 165 DIV. 30

***DATA STORAGE SYSTEMS**

MODERN CRYSTALLOGRAPHY. THIS RESEARCH IS CONCERNED WITH COLLECTION OF ALL PHYSICAL AND CHEMICAL DATA OR SOLIDS AND THE COLLATION AND ANALYSIS OF THESE DATA FOR USE IN SOLID STATE RESEARCH.
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THE RESULTS ARE DESCRIBED OF A STUDY PROGRAM CONDUCTED FOR THE PURPOSE OF EXPLORING AND OUTLINING THE POTENTIAL APPLICATIONS OF DIGITALLY STORED STEREO DATA AS OUTPUT BY AN AUTOMATIC DOUBLE PROJECTION STEREO PLOTTER IN TERMS OF BOTH CONVENTIONAL PHOTOGRAMMETRIC METHODS AND MORE UNCONVENTIONAL MEANS.
AD-285 550 DIV. 2

***DATA TRANSMISSION SYSTEMS**

ERROR PROBABILITIES FOR ADAPTIVE MULTICHANNEL RECEPTION OF BINARY SIGNALS.
AD-284 651 DIV. 5

INSTALLATION AND CHECKOUT OF THE SIMPLIFIED AIRBORNE INSERTION-DISPLAY EQUIPMENT (AIDE). PHOTOELECTRIC SELECTION TO POSITION THE INFORMATION TAPES DIRECTLY FROM DIGITAL INFORMATION.
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THE BASIC CHARACTERISTICS OF IMPULSE NOISE AND ITS EFFECTS ON VARIOUS TYPES OF BINARY DATA TRANSMISSION SYSTEMS.
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EFFECTS OF UNCERTAINTY AND MONETARY INCENTIVES ON ESTIMATION. BIAS AND INACCURACIES OF ESTIMATES IN PERFORMANCE OF TASKS WITH UNCERTAIN OUTCOMES. MONETARY INCENTIVES EFFECTIVE IN THE DIRECTION OF ESTIMATES AND AMOUNT OF DISCREPANCY.
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A LITERATURE REVIEW OF MATHEMATICAL THEORIES IN PERFORMANCE, DECISION MAKING, AND LEARNING FROM 1930-1959. RESTRICTED TO INFORMATION THEORY, GAME AND DECISION THEORY, AND PROBABILISTIC LEARNING THEORIES.
AD-285 565 DIV. 28

***DECOMPOSITION**

CATALYTIC DECOMPOSITION OF HYDRAZINE. THE MOST PROMISING CATALYST, GIRDLER T-323 WITH 50% PRE-REDUCED COBALT ON A KIESELGUHR SUPPORT, WAS CAPABLE OF INITIATING DECOMPOSITION AT 33 C AND RE-START AT 53 C.
AD-285 083 DIV. 4

***DEFORMATION**

SOME VARIATIONAL PRINCIPLES IN ANISOTROPIC AND NONHOMOGENEOUS ELASTICITY. A VARIATIONAL APPROACH TO THE THEORY OF THE ELASTIC BEHAVIOR OF POLYCRYSTALS.
AD-284 929 DIV. 17

***DEFORMATION**
ELASTOMERS

COMPRESSION-SET BEHAVIOR OF IRRADIATED ELASTOMERS. EXPERIMENTAL DATA WHICH EXTENDED OVER 5 LOGARITHMIC DECADES OF DOSE ARE WELL INTERPRETED BY AN EMPIRICAL EQUATION.
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***DEFORMATION**
SINGLE CRYSTALS

FUNDAMENTAL STUDY OF ROLLING CONTACT FATIGUE. NYLON AND TEFLON BALLS ROLLED UNDER LOAD UPON A PREPARED (001) SURFACE OF LIF LEFT A DISTINCTIVE DISLOCATION TRACE AS REVEALED BY AN ETCH PITTING TREATMENT.
AD-285 085 DIV. 25

***DEHYDRATED SUBSTANCES**

DETERMINATION OF THE PHYSICAL AND CHEMICAL CHANGES IN EVAPORATED MILK STORED IN CANS FOR FOUR YEARS AT 32 F.
AD-285 103 DIV. 29

PRECOOKED DEHYDRATED MEALS FOR PERSONNEL ON MEDIUM FLIGHT. TRAY DESIGN AND PACKAGING. A SPECIAL HEATING DEVICE.
AD-285 813 DIV. 29

***DELAY CIRCUITS**

THE THEORY OF OPERATION AND EVALUATION OF PERFORMANCE OF A DELAY-LOCK TRACKING SYSTEM FOR BINARY SIGNAL IS PRESENTED.
AD-285 566 DIV. 8

***DETECTION**

DEVELOPMENT TESTS AND INVESTIGATION OF DETECTION SYSTEMS FOR FAILURES IN BILLET CONTAINERS ULTRASONIC AND ELECTROMAGNETIC SYSTEMS.
AD-285 038 DIV. 30

EXPERIMENTAL MODEL OF A NUCLEAR/WEATHER CLOUD DETECTOR TO BE USED WITH A RADAR SET FOR THE DETECTION AND ANALYSIS OF NUCLEAR CLOUDS OR SMALL CHANGES IN WEATHER PATTERNS.
AD-285 114 DIV. 2

***DEUTERIUM**

REVISED CROSS SECTIONS FOR NEUTRON INTERACTIONS WITH OXYGEN AND DEUTERIUM. A REVISION OF THE DATA FOR ANGULAR DISTRIBUTIONS FOR ELASTIC NEUTRON SCATTERING IS PRESENTED. COMPLETE CROSS SECTIONS FOR BOTH MATERIALS ARE PRESENTED. KINETICS OF THE (N,2N) REACTION IN DEUTERIUM IS DISCUSSED.
AD-284 996 DIV. 20

***DEUTERON REACTIONS**

PARAMETERS OF NUCLEAR INTERACTIONS PRODUCED IN NUCLEAR EMULSIONS OF MEAN ENERGY 275 MEV ANALYZED TO ASCERTAIN MATERIAL NEEDED FOR STUDY OF PRIMARY COSMIC RAY DEUTERONS.
AD-284 608 DIV. 20

***DIABETES**

THE EFFECTS OF HORMONES, SERIAL TRANSPLANTATION, AND THYMECTOMY ON PANCREAS TRANSPLANTS, THE EFFECTS OF ALLOXAN-INDUCED DIABETES AND PANCREAS IMPLANTS ON BLOOD CHEMISTRY, AND THE DAMAGE TO THE EXOCRINE PANCREAS PRODUCED BY DL-ETHIONINE ARE STUDIED IN HAMSTERS.
AD-285 571 DIV. 16

***DIELECTRICS**

PEM FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200 C.
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STRESS-STRAIN CHARACTERISTICS OF SHELLS AND HIGH EXPLOSIVES.
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THE HIGH LEVELS OF VITAMIN A FOUND IN THE LIVES OF RATS LIVING AT 0 C IS NOT DUE TO A SPARING ACTION INDUCED BY COLD ACCLIMATION, BUT INSTEAD IS THE DIRECT RESULT OF THE INCREASED FOOD INTAKE THAT ACCOMPANIES COLD EXPOSURE.
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STUDIES IN CRYSTAL PREPARATION AND STRUCTURAL MECHANISMS FOR NEW PHYSICAL PROPERTIES OF SOLIDS. FERROELECTRIC MECHANISM STUDIES WERE CONCERNED WITH OPTICAL ROTATORY POWER PHENOMENON. OTHER STUDIES INCLUDED ORDER-DISORDER PHENOMENA IN FERROELECTRICS, FITZGERALD AUDIO-MECHANICAL RESONANCE, DIELECTRIC BEHAVIOR OF CLATHRATES, STUDIES TO DISCOVER IF A CORRELATION EXISTS BETWEEN STRUCTURE AND ELECTRICAL CONDUCTIVITY in highly-optical-absorbing organic crystals.
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STUDIES IN CRYSTAL PREPARATION AND STRUCTURAL MECHANISMS FOR NEW PHYSICAL PROPERTIES OF SOLIDS. FERROELECTRIC MECHANISM STUDIES WERE CONCERNED WITH OPTICAL ROTATORY POWER PHENOMENON. OTHER STUDIES INCLUDED ORDER-DISORDER PHENOMENA IN FERROELECTRICS, FITZGERALD AUDIO-MECHANICAL RESONANCE, DIELECTRIC BEHAVIOR OF CLATHRATES, STUDIES TO DISCOVER IF A CORRELATION EXISTS BETWEEN STRUCTURE AND ELECTRICAL CONDUCTIVITY in highly-optical-absorbing organic crystals.
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***FILAMENTS**

EVALUATION OF COATED AND UNCOATED LARGE DIAMETER GLASS FIBERS AFTER SUBJECTION TO SEA WATER IMMERSION.
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***FIRES**

THE CONCEPT OF USING CHEMICAL ADDITIVES TO IMPROVE THE EFFECTIVENESS OF WATER FOR CLASS A FIRES PROVED FEASIBLE, VALUABLE AND LOGICALLY SOUND. LABORATORY FIRE TESTS SHOWED MARKED
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HIGH-SPEED DOCUMENT PERUSAL; STEPS TOWARD FEASIBILITY OF A COOPERATIVE MAN-MACHINE SYSTEM FOR HIGH-QUALITY, HIGH-SPEED PERUSAL OF LARGE DOCUMENT COLLECTIONS.
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ANNUAL PROGRESS REPORT FROM ARMY MEDICAL RESEARCH AND NUTRITION LAB. INTERNAL MEDICINE AND BASIC RESEARCH IN LIFE SCIENCES. CARDIO-PULMONARY-RENAL DISEASE, METABOLISM AND NUTRITION, PHARMACOLOGY OF THE COMBAT SOLDIER, BIOCHEMISTRY, AND PHYSIOLOGY.
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AD-285 356 DIV. 30

***MERCURY ELECTRODES**

MERCURY CELL BATTERY STUDIES - CHEMICAL REACTIVITY RATES, ELECTRODE SPACING, SEPARATOR RESISTANCE MEASUREMENT, AUTOMATIC CYCLE LIFE TESTS PASSED 1000 CYCLES.
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ANNUAL PROGRESS REPORT FROM ARMY MEDICAL RESEARCH AND NUTRITION LAB. INTERNAL MEDICINE AND BASIC RESEARCH IN LIFE SCIENCES. CARDIO-PULMONARY-RENAL DISEASE, METABOLISM AND NUTRITION, PHARMACOLOGY OF THE COMBAT SOLDIER, BIOCHEMISTRY, AND PHYSIOLOGY.
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***METAL PLATES**

THE VIBRATIONS IN THE PANELS OF THE AIRFRAME OF A CARAVELLE TEST SECTION EXCITED BY JET ENGINE NOISE WERE STUDIED.
AD-284 886 DIV. 25

***METAL SEALS**

CERAMIC-TO-METAL SEALS FOR HIGH POWER TUBES. VARIABLES AFFECTING SEAL TENSILE STRENGTHS. ACHIEVING HIGHEST POSSIBLE RELIABILITY.
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ELECTRON THEORY OF METALS AND SEMICONDUCTORS.
AD-284 887 DIV. 25

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AD-285 483 DIV. 14

THE EMBRITTLEMENT OF REFRACTORY METAL IN BRAZED AND WELDED JOINTS IS ATTACKED BY DIFFUSION BONDING BELOW EMBRITTLEMENT TEMPERATURES. A LITERATURE SURVEY ON DIFFUSION BONDING OF REFRACTORY METALS IS PRESENTED.
AD-285 581 DIV. 14

***METALS**
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BASE BARRIER COMBINATIONS INVOLVING THE REFRACTORY METALS W, MO, TA, NB AND 12 POTENTIAL BARRIER METALS WERE EVALUATED FOR RELATIVE INTERDIFFUSION BEHAVIOR AT 1700 C. TESTS WERE ALSO MADE AT 1800 AND 2100 C.
AD-285 569 DIV. 14

***METALS**
ICE

ADHESION-SHEAR STRENGTH OF ICE FROZEN TO CLEAN AND LUBRICATED SURFACES. MEASUREMENTS WERE MADE AT 3 DIFFERENT TEMPERATURES, -1, -6, AND -20 C ON BULK PLASTIC, PLASTIC FILM, LUBRICATED PLASTIC, AND LUBRICATED METAL SURFACES. ALL EXPERIMENTS INDICATE THAT AN EFFECTIVE COATING MUST BE A FLUID OR SEMIFLUID MATERIAL ON WHICH ICE WILL SLIDE.
AD-285 093 DIV. 4

***METALS**
MECHANICAL PROPERTIES

BASIC PARAMETERS OF METAL BEHAVIOR UNDER HIGH RATE FORMING.
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***METEOROLOGICAL BALLOONS**

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***METEOROLOGICAL BALLOONS**
MANUFACTURING METHODS

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***METEOROLOGICAL DATA**

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SONIC ANEMOMETER DATA ACQUISITION AND ANALYSIS SYSTEM. CALCULATION OF EULERIAN SCALE OF TURBULENCE FROM BIVANE DATA.
AD-284 964 DIV. 30

***METEOROLOGICAL INSTRUMENTS**

SONIC ANEMOMETER DATA ACQUISITION AND ANALYSIS SYSTEM. CALCULATION OF EULERIAN SCALE OF TURBULENCE FROM BIVANE DATA.
AD-284 964 DIV. 30

DEMANDS ON OPERATING METEOROLOGICAL INSTRUMENTS TO FUNCTION EFFECTIVELY UNDER ACTUAL CONDITIONS.
AD-285 018 DIV. 2

***METEOROLOGY**

SONIC ANEMOMETER DATA ACQUISITION AND ANALYSIS SYSTEM. CALCULATION OF EULERIAN SCALE OF TURBULENCE FROM BIVANE DATA.
AD-284 964 DIV. 30

PRESENTATION CONCERNING THE EXAMINATION AND EVALUATION OF SOME SAMPLE TIROS II RADIATION MEASUREMENTS. ALSO OF INTEREST IS THE RELATIONSHIP OF TROPOSPHERIC RADIATIVE HEAT BUDGET WITH THE UPWARD FLUX AT THE TROPOPAUSE.
AD-285 982 DIV. 2

***METEOROLOGY**
ARCTIC REGIONS

STUDIES OF THE SUMMER CLIMATIC CONDITIONS ON WARD HUNT ISLAND AND AN ASSESSMENT OF THE ABLATION SEASON HEAT-BALANCE COMPONENTS.
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***METEORS**

RADAR-ECHO RATE FROM SHOWER METEORS.
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AN ANNOTATED BIBLIOGRAPHY ON METEOR TRAIL OBSERVATIONS IS PRESENTED.
AD-285 335 DIV. 2

***METEORS**
SOUTHERN HEMISPHERE

A SURVEY SHOWS THAT RELIABLE METEOR RATES CAN BE OBTAINED FREE FROM THE INFLUENCE OF IONOSPHERIC EFFECTS AND ESTABLISHED THE ANGLE BETWEEN THE OBSERVING STATION AND THE APEX OF THE EARTH'S WAY AS THE DOMINATING INFLUENCE.
AD-284 951 DIV. 2

***MICROBIOLOGY**

SURVEILLANCE OF PROBABLE HOSTS AND VECTORS OF EASTERN ENCEPHALITIS VIRUS INCLUDING THE SCREENING OF SPECIMENS IN 3-WEEK-OLD MICE FOR INDICATIONS OF VIREMIA AND HOLDING OF ARTHROPOD SPECIMENS AND SERUM FRACTIONS FOR CONFIRMATORY STUDIES.
AD-285 323 DIV. 16

***MICROMINIATURIZATION (ELECTRONICS)**

MICRO-MODULE PRODUCTION PROGRAM. INCLUDES WORK ON CAPACITORS, RESISTORS, INDUCTORS, SEMICONDUCTORS, TRANSISTORS, DIODES, CRYSTALS, RELIABILITY, COMMUNICATION EQUIPMENT, AND THE MICROPAC COMPUTER SYSTEM.
AD-285 068 DIV. 8

***MICROORGANISMS**

RESEARCH AND DEVELOPMENT LIAISON BETWEEN USDA AND QUARTERMASTER CORPS, FOOD, TEXTILES AND LEATHER, CHEMICALS AND POLYMERS, PACKAGING, ENVIRONMENTAL AND SOIL RESEARCH, PESTICIDES AND MICROBIOLOGICAL INVESTIGATIONS.
AD-285 216 DIV. 29

***MICROWAVE AMPLIFIERS**

A TUNNEL DIODE SLOT AMPLIFIER DEVELOPED FOR USE IN AN EXPERIMENTAL SIMULTANEOUSLY SCANNED LINEAR ARRAY.
AD-284 491 DIV. 8

AN UNEXPECTED EFFECT IN AN EXPERIMENTAL TRANSVERSE WAVE TUBE. GAIN IN EXCESS OF 30 DB WAS OBSERVED IN A LONG METALLIC DRIFT TUBE CONSISTING OF TWO CUCCIA-COUPLERS.
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AN EXPERIMENTAL AMPLIFIER BASED ON COUPLING BETWEEN CYCLOTRON AND SYNCHRONOUS WAVES IN A PERIODIC MAGNETOSTATIC FIELD.
AD-285 468 DIV. 8

***MICROWAVE OSCILLATORS**

NOISE MEASUREMENTS NEAR THE CARRIER OF A V-217 REFLEX KLYSTRON. SELF- AND CROSS-SPECTRA OF THE FREQUENCY MODULATION AND BEAM CURRENT NOISE OF TWO VA 161'S AND ONE QK 610 BACKWARD WAVE OSCILLATORS.
AD-284 788 DIV. 8

***MICROWAVE RELAY SYSTEMS**

A SOLID STATE INTERMEDIATE POWER AMPLIFIER CAPABLE OF DELIVERING RF POWER OUTPUT OF TWO WATTS TO THE FINAL STAGE OF THE AN/GRC-103 TRANSMITTER COVERING THE 220 - 400 MC FREQUENCY RANGE.
AD-285 193 DIV. 8

***MICROWAVES**

MILLIMETER AND SUBMILLIMETER WAVE RECEIVER TECHNIQUES INCLUDING NEW ELECTROMAGNETIC DETECTION TECHNIQUES, PHYSICS PHENOMENA FOR DETECTOR APPLICATION, TRANSMISSION LINES AND TRANSMISSION LINE COMPONENTS.
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INTERACTION OF MICROWAVE RADIATION WITH A WEAKLY IONIZED GAS.
AD-285 253 DIV. 25

TWO PARALLEL PLATE MICROWAVE LENSES ARE DESIGNED. SUCH LENSES OPERATE ON THE PRINCIPLE THAT MICROWAVE ENERGY WILL PROPAGATE BETWEEN PARALLEL CONDUCTING SHEETS WITH A PHASE VELOCITY EXCEEDING THAT OF LIGHT; HENCE, THIS MEDIUM HAS AN APPARENT INDEX OF REFRACTION WHICH IS LESS THAN UNITY.
AD-285 513 DIV. 8

***MILITARY FACILITIES**

FACILITIES AND PROGRAMS AT THE NAVAL MEDICAL FIELD RESEARCH LAB AT CAMP LEJEUNE. FACILITIES AND PROGRAMS FOR THERMAL STRESSES AND BURNS, NON-SPECIFIC URETHRITIS, TESTS OF NEW DENTAL EQUIPMENT, RESPIRATORY DISEASES, BODY ARMOR, PERFORMANCE CRITERIA IN COMBAT.
AD-285 396 DIV. 16

***MILITARY MEDICINE**

ANNUAL PROGRESS REPORT FROM ARMY MEDICAL RESEARCH AND NUTRITION LAB. INTERNAL MEDICINE AND BASIC RESEARCH IN LIFE SCIENCES. CARDIO-PULMONARY-RENAL DISEASE, METABOLISM AND NUTRITION, PHARMACOLOGY OF THE COMBAT SOLDIER, BIOCHEMISTRY, AND PHYSIOLOGY.
AD-284 542 DIV. 16

***MILITARY PERSONNEL**

OSCAR, OPTIMUM SELECTION, CLASSIFICATION, AND ASSIGNMENT OF RECRUITS. THREE MATHEMATICAL MODELS FOR APPLICATION TO PERSONNEL PROCUREMENT AND ASSIGNMENT. CONTROL OF A COMPLEX PERSONNEL SYSTEM.
AD-285 186 DIV. 23

***MILITARY RATIONS**

PRECOOKED DEHYDRATED MEALS FOR PERSONNEL ON MEDIUM FLIGHT. TRAY DESIGN AND PACKAGING. A SPECIAL HEATING DEVICE.
AD-285 213 DIV. 29

***MILITARY TRAINING**

ANALYSIS OF ATC COURSE ALR29335A, CHANNEL AND TECHNICAL CONTROL OPERATOR. SATISFACTORY OPERATOR PERFORMANCE AFTER TWO TO THREE WEEKS OF ON-THE-JOB TRAINING. RECOMMENDATION FOR A JOINT BASIC/LATERAL COURSE BY ADDITION OF AN INITIAL BASIC COMMUNICATIONS FAMILIARIZATION PHASE.
AD-284 879 DIV. 23

INDUCED STRESS IN A NAVAL TRAINING SCHOOL. EFFECTS OF INDUCED STRESS ON LEARNING AND PERFORMANCE.
AD-284 679 DIV. 23

EFFECTIVENESS OF ATC COURSE ABR36231, DIAL CENTRAL OFFICE EQUIPMENT SPECIALIST. JOB TRAINING STANDARDS AND REQUIREMENTS.
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***MILITARY TRANSPORTATION**
CARGO

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AD-285 296 DIV. 30

***MILK**
DETERIORATION

DETERMINATION OF THE PHYSICAL AND CHEMICAL CHANGES IN EVAPORATED MILK STORED IN CANS FOR FOUR YEARS AT 32 F.
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***MINERALS**

LABORATORY EXPERIMENTS ON MINERAL SYNTHESIS BY DIFFUSION ARE ELUCIDATED. THE DIFFERENCES OF NATURAL GROWTH AND LABORATORY GROWTH OF CRYSTALS ARE EXPLAINED.
AD-284 837 DIV. 25

***MINIATURE ELECTRONIC EQUIPMENT**

FABRICATION METHODS FOR MINIATURE INDUCTORS EMPLOYING THIN-FILM SPIRAL CONDUCTORS ON FERRITE SUBSTRATES WITH FERRITE FILMS. THE INDUCTANCE RANGE IS FROM 38 MICROHENRYS TO MILLIHENRY WITH A MINIMUM Q VALUE OF 100 AT A FREQUENCY OF 1 MC.
AD-285 039 DIV. 8

***MODULATORS**

A METHOD OF REALIZING AUDIOFREQUENCY 90 DEGREE PHASE SHIFTERS FOR USE IN SINGLE SIDE-BAND MODULATORS.
AD-285 005 DIV. 8

A HIGH TEMPERATURE PULSE FORMING NETWORK FOR USE IN RADAR MODULATORS WHICH; WHEN IT FAILED; WOULD NOT GENERATE HYDROGEN OR OTHER HAZARDOUS GASES.
AD-285 305 DIV. 8

***MOISTURE**

NONLINEAR EQUATION OF MOISTURE TRANSFER FOR THE FIRST STAGE OF DRYING OF A MOIST SOIL.
AD-284 998 DIV. 2

TEST METHODS FOR MEASURING THE MOISTURE CONTENT OF EXPANDABLE POLYSTYRENE PARTS.
AD-285 062 DIV. 14

***MOLECULAR ROTATION**

BASIC SPECTRAL DATA FOR THE ROTATION BAND OF WATER VAPOR; WATER VAPOR LINE WIDTHS. BASIC SPECTRAL DATA FROM ZERO TO THE 1/1000 CM REGION.
AD-285 181 DIV. 25

***MOLECULAR SPECTROSCOPY**

BASIC SPECTRAL DATA FOR THE ROTATION BAND OF WATER VAPOR; WATER VAPOR LINE WIDTHS. BASIC SPECTRAL DATA FROM ZERO TO THE 1/1000 CM REGION.
AD-285 181 DIV. 25

***MOLECULAR SPECTROSCOPY**
SYMPOSIA

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AD-284 816 DIV. 25

***MOLECULAR STRUCTURE**
SYMPOSIA

SUMMARIES OF 4 PAPERS ON PROGRESS IN THE QUANTUM THEORY OF MANY-ELECTRON SYSTEMS.
AD-284 816 DIV. 25

***MOLECULAR WEIGHT**

KERATAN SULFATE AND CHONDROITIN SULFATE FROM BOVINE CORNEA AND SODIUM POLYACRYLATE WERE FRACTIONATED BY ECTEOLA RESIN CHROMATOGRAPHY AND CETYLPYRIDINIUM COMPLEX FORMATION. A RELATIONSHIP BETWEEN MOLECULAR WEIGHT AND THE CRITICAL SALT CONCENTRATION FOR SOLUBILIZATION OF THE CETYLPYRIDINIUM COMPLEX WAS CONFIRMED.
AD-284 818 DIV. 16

PROPOSED REVISION OF U. S. STANDARD ATMOSPHERE 90 TO 700KM IN ACCORDANCE WITH THE ARDC 1959 MODEL AND EQUATIONS AND TECHNIQUES BY WHICH THE REVISION WAS DEVELOPED.
AD-285 019 DIV. 2

***MOLECULES**

BASIC SPECTRAL DATA FOR THE ROTATION BAND OF WATER VAPOR; WATER VAPOR LINE WIDTHS. BASIC SPECTRAL DATA FROM ZERO TO THE 1/1000 CM REGION.
AD-285 181 DIV. 25

***MOLYBDENUM**
ROLLING MILLS

MOLYBDENUM SHEET ROLLING. NECESSITY OF CARBON IN EXCESS OF 0.20% FOR MAXIMUM HIGH-TEMPERATURE PROPERTIES IN MO PLUS 0.5% TI AND TZM.
AD-284 932 DIV. 17

***MOLYBDENUM ALLOYS**

MACRO-, MICRO-, HARDNESS-, AND CHEMISTRY DATA ARE PRESENTED FOR 2 INGOTS OF MO+0.5% TI+ 0.1% ZR.
AD-284 577 DIV. 17

HEAT TREATING STUDIES ON SINGLE MO CRYSTALS SWAGED 95% AT 800 F INDICATED A RECRYSTALLIZATION BETWEEN 1200 AND 1300 F. TENSILE PROPERTIES OF 0.030-IN. ROLLED SHEETS OF HYDROGEN-REDUCED MO EXTRUSIONS PREPARED FROM ELECTRON-BEAM-MELTED BILLETS.
AD-284 814 DIV. 17

DEVELOPMENT OF POWDER-METALLURGICAL MO-0.5TI-C SHEET; EFFECTS OF SINTERING CONDITIONS, C CONCENTRATION, HEAT TREATMENT.
AD-285 532 DIV. 17

***MOLYBDENUM ALLOYS**
MELTING

PROCEDURES FOR PREPARING THERMITICALLY REDUCED MO, DATA ON CHEMICAL ANALYSIS AND PHYSICAL PROPERTIES.
AD-284 815 DIV. 17

ELECTRON BEAM AND ARC MELTING OF MO ARE BRIEFLY DISCUSSED. EQUIPMENT MODIFICATION AND INGOT EVALUATION ARE DESCRIBED.
AD-284 817 DIV. 17

***MOLYBDENUM ALLOYS**
MICROSTRUCTURE

MICROSTRUCTURE, HOT HARDNESS, AND EXTRUSION CONSTANTS FOR MO-, MO-W, AND W-BASE ALLOYS. CARBON SYNERGISM STUDIED FOR MO-3% TI-0.5% ZR AND MO-25% W-1.25% TI-0.1% ZR.
AD-284 832 DIV. 17

***MOLYBDENUM COMPOUNDS**

MEASUREMENT OF INFRARED, VISIBLE AND ULTRAVIOLET SPECTRA OF MOLYBDENUM COMPLEXES.
AD-284 627 DIV. 4

***MONEY**

LINEAR PROGRAMMING TECHNIQUES ARE APPLIED TO MANAGEMENT PROBLEMS IN BUDGETING AND FINANCIAL PLANNING.
AD-284 668 DIV. 26

***MONOMOLECULAR FILMS**

INVESTIGATION OF ADSORPTIVE PROPERTIES OF FATTY AMINE MONOLAYERS BY CONTACT POTENTIAL MEASUREMENTS.
AD-284 574 DIV. 4

***MOON**

HYPSOMETRIC MAP OF THE MOON WITH THE BASIC LUNAR FORMATIONS.
AD-284 769 DIV. 2

POLARIZATION PROPERTIES OF LUNAR FORMATIONS INVESTIGATED IN 3 REGIONS OF THE SPECTRUM; IN THE TOTAL LUMINOUS FLUX AND IN THE BLUE AND YELLOW SPECTRAL REGIONS, BY USING SPECIAL FILTERS.
AD-285 341 DIV. 2

ON THE STATE OF ALPHONSUS CRATER BEFORE THE ONSET OF THE ERUPTION OF 3 NOV 1958. SPECTROPHOTOMETRIC OBSERVATIONS.
AD-285 347 DIV. 2

***MOON**
EXTRATERRESTRIAL GEOGRAPHY

THE POSITION ANGLE METHOD FOR DETERMINING LUNAR PHYSICAL LIBRATION PARAMETERS.
AD-285 199 DIV. 2

***MOON**
SURFACE PROPERTIES

PROBABLE DIMENSIONS OF IRREGULARITIES IN THE MICRORELIEF OF THE LUNAR SURFACE.
AD-285 340 DIV. 2

***MOON**
SURFACE TEMPERATURES

ATTEMPTS TO DETERMINE TEMPERATURE OF SEPARATE SECTORS OF THE LUNAR SURFACE.
AD-285 343 DIV. 2

***MUCOSACCHARIDES**
EYE

KERATAN SULFATE AND CHONDROITIN SULFATE FROM BOVINE CORNEA AND SODIUM POLYACRYLATE WERE FRACTIONATED BY ECTEOLA RESIN CHROMATOGRAPHY

AND CETYLPYRIDINIUM COMPLEX FORMATION. A RELATIONSHIP BETWEEN MOLECULAR WEIGHT AND THE CRITICAL SALT CONCENTRATION FOR SOLUBILIZATION OF THE CETYLPYRIDINIUM COMPLEX WAS CONFIRMED.
AD-284 818 DIV. 16

*MUCOSACCHARIDES
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*PLASMA OSCILLATIONS

A THEORY, DESCRIBING SMALL AMPLITUDE, LONGITUDINAL, COHERENT OSCILLATIONS IN A PLASMA IS COMPARED WITH RECENT OBSERVATIONS.
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*PLASMA PHYSICS

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A SELF-SIMILAR SOLUTION OF THE ELECTROGASDYNAMICAL BLAST WAVE IS FOUND. ITS SHOCK FRONT PROPAGATES EXPONENTIALLY WITH TIME AND ITS ENERGY ALSO INCREASES EXPONENTIALLY WITH TIME.
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AD-285 384 DIV. 25

*PLASTIC COATINGS
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*PLASTIC FLOW

ANISOTROPIC EXTENSION OF MICROCRACKS BY PLASTIC FLOW IN SEMI-BRITTLE SOLIDS. IT IS PROPOSED THAT THE MAIN FACTOR RESPONSIBLE FOR EXTENDING A SURFACE MICROCRACK IS THE LOCAL PLASTIC CONSTRAINT THAT IT EXERTS. THE MAGNITUDE OF CONSTRAINT IN A SINGLE CRYSTAL DEPENDS ON THE ORIENTATION OF THE SURFACE WITH RESPECT TO BURGERS VECTOR.
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*PLASTICITY

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*PLASTICS

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*PLASTICS
GOLD PLATING

TECHNIQUES FOR REPAIRING GOLD PLATED GLASS REINFORCED PLASTICS.
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*PLASTICS
ICE

ADHESION-SHEAR STRENGTH OF ICE FROZEN TO CLEAN AND LUBRICATED SURFACES. MEASUREMENTS WERE MADE AT 3 DIFFERENT TEMPERATURES: -1, -6, AND -20 C ON BULK PLASTIC, PLASTIC FILM, LUBRICATED PLASTIC, AND LUBRICATED METAL SURFACES. ALL EXPERIMENTS INDICATE THAT AN EFFECTIVE COATING MUST BE A FLUID OR SEMIFLUID MATERIAL ON WHICH ICE WILL SLIDE.
AD-285 093 DIV. 4

*PLASTICS
LAMINATES

OBJECTIVE OF THIS PROGRAM WAS TO DETERMINE WHICH OF SEVERAL TEST PROCEDURES EFFICIENTLY YIELDS THE MOST ACCURATE AND REPRODUCIBLE DATA ON LAMINATES. OF 3 TEST JIGS, THE LP-406B WITH A MODIFIED SPECIMEN PRODUCED THE MOST REALISTIC ULTIMATE COMPRESSIVE STRENGTHS AND STRESS-STRAIN CURVES.
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*PLASTICS
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COMPRESSION STRENGTH OF GLASS CLOTH REINFORCED PLASTICS AT ROOM AND AT ELEVATED TEMPERATURES.
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*PLASTICS
SANDWICH CONSTRUCTION

EVALUATION OF STRUCTURAL PROPERTIES OF GLASS REINFORCED PLASTIC CONSTRUCTION AFTER PROLONGED EXPOSURES TO TEMPERATURES UP TO 325 F.
AD-285 484 DIV. 14

*PLASTICS
SHIELDING

PLASTIC MATERIALS IN LIGHT WEIGHT NEUTRON SHIELDS. A REVIEW OF THE NEUTRON SHIELDING PROCESS IS PRESENTED. CRITERIA FOR DETERMINING THE RELATIVE EFFECTIVENESS OF SHIELDING MATERIALS INCLUDE H DENSITY, PRESENCE OF NEUTRON-ABSORBING MATERIALS, SECONDARY GAMMA EMITTERS. A LIST OF THE MAJOR PLASTIC MATERIALS AND THEIR RELATIVE SHIELDING VALUES IS PRESENTED.
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*PNEUMATIC SERVOMECHANISMS

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*PNEUMATIC SYSTEMS

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*POLARIZATION

POLARIZATION PROPERTIES OF LUNAR FORMATIONS INVESTIGATED IN 3 REGIONS OF THE SPECTRUM: IN THE TOTAL LUMINOUS FLUX AND IN THE BLUE AND

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VISCOELASTIC PROPERTIES OF CROSSLINKED POLY(ETHYLENE TETRASULFIDE).
AD-284 785 DIV. 14

KERATAN SULFATE AND CHONDROITIN SULFATE FROM BOVINE CORNEA AND SODIUM POLYACRYLATE WERE FRACTIONATED BY ECTEOLA RESIN CHROMATOGRAPHY AND CETYLPYRIDINIUM COMPLEX FORMATION. A RELATIONSHIP BETWEEN MOLECULAR WEIGHT AND THE CRITICAL SALT CONCENTRATION FOR SOLUBILIZATION OF THE CETYLPYRIDINIUM COMPLEX WAS CONFIRMED.
AD-284 818 DIV. 16

*POLYMERS
MILITARY RESEARCH

RESEARCH AND DEVELOPMENT LIAISON BETWEEN USDA AND QUARTERMASTER CORPS. FOOD, TEXTILES AND LEATHER, CHEMICALS AND POLYMERS, PACKAGING, ENVIRONMENTAL AND SOIL RESEARCH, PESTICIDES AND MICROBIOLOGICAL INVESTIGATIONS.
AD-285 216 DIV. 29

*POLYMERS
MOLECULAR STRUCTURE

MARKOFF CHAINS - POLYMER CHAINS. A 2-DIMENSIONAL MODEL FOR SEMICRYSTALLINE POLYMERS.
AD-285 189 DIV. 4

*POLYMERS
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AD-285 062 DIV. 14

*POLYMERS
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AD-285 523 DIV. 14

*POLYMERS
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AD-285 064 DIV. 4

*POLYNOMIALS

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AD-285 176 DIV. 15

*POSITION FINDING

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AD-284 917 DIV. 30

*POTASSIUM COMPOUNDS

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AD-285 432 DIV. 4

*POWDER METALLURGY

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*POWER AMPLIFIERS

A SOLID STATE INTERMEDIATE POWER AMPLIFIER CAPABLE OF DELIVERING RF POWER OUTPUT OF TWO WATTS TO THE FINAL STAGE OF THE AN/GRC-103 TRANSMITTER COVERING THE 220 - 700 MC FREQUENCY RANGE.
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*POWER REACTORS

THE GENERAL CONSTRUCTION AND CONTROL DETAILS AND THE PHYSICAL PARAMETERS OBTAINED FOR THE SOVIET BERYLLIUM PHYSICS REACTOR ARE DISCUSSED.
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THE EFFECTS OF NUCLEAR RADIATION ON THE PROPERTIES OF REACTOR STRUCTURAL MATERIALS ARE STUDIED WITH EMPHASIS ON STEEL.
AD-285 268 DIV. 20

*POWER SUPPLIES
ELECTROLYTIC CELLS

THERMALLY ACTIVATED CERAMIC-METAL CELLS. AN IRON ANODE, LITHIUM BOROSILICATE ENAMEL-ELECTROLYTE AND SILVER CATHODE CELL CONFIGURATION WAS STUDIED. OPERATING TEMPERATURE RANGE WAS 450 TO 700 F. ELECTRIC POWER GENERATION RESULTED FROM THE FREE ENERGY OF ANODE OXIDATION REACTION. ANOMALOUS CHARGE STORAGE WAS NOTED AT 450 C.
AD-284 891 DIV. 7

*POWER SUPPLIES
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ENERGY CONVERSION RESEARCH PROGRAM. DIRECT CONVERSION OF CHEMICAL ENERGY TO ELECTRICAL ENERGY. PROTOTYPE FUEL CELLS EMPLOYING CL AS OXIDANT; PCL3 AS FUEL AND CH3SCN AS THE SOLVENT WERE INVESTIGATED. PYROLYTIC PROCESSES FOR REGENERATION OF REACTION PRODUCTS WERE STUDIED.
AD-285 084 DIV. 7

*POWER SUPPLIES
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MERCURY CELL BATTERY STUDIES - CHEMICAL REACTIVITY RATES; ELECTRODE SPACING; SEPARATOR RESISTANCE MEASUREMENT; AUTOMATIC CYCLE LIFE TESTS PASSED 1000 CYCLES.
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*PRECIPITATION
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*PRESSURE VESSELS

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THE TERMINOLOGY, SYMBOLOGY, AXIOMS AND SOME PRINCIPAL THEOREMS OF SET THEORY ARE PRESENTED. ALSO INCLUDED IS THE APPLICATION OF SET THEORY TO PROBABILITY THEORY.
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*PROCESSING

THE EFFECTS OF PLASTICALLY DEFORMING AUSTENITE ON THE STRENGTH OF SUBSEQUENTLY FORMED MARTENSITE IN AN IRON-31.9 WT-% NICKEL-0.017 WT-% CARBON ALLOY.
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*PROGRAMMING
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STRESS-STRAIN CHARACTERISTICS OF SHELLS AND HIGH EXPLOSIVES.
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*PROPELLANT GRAINS
AERODYNAMIC HEATING

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AD-285 282 DIV. 10

*PROPELLANT GRAINS
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MODIFIED WAGON WHEEL GRAIN DESIGN W SUB 1 GREATER THAN W SUB 2 + W SUB 3; W SUB 1 + W SUB 2 GREATER THAN W SUB 3; W SUB 1 + W SUB 3 GREATER THAN W SUB 2. A WAGON WHEEL GRAIN DESIGN MODIFICATION IS CONSIDERED IN WHICH SHORT SPEARS OR SPOKES OF PROPELLANT ALTERNATE WITH LONGER ONES; 3 DIFFERENT WEBS GIVE RISE TO A 3-LEVEL SURFACE-TIME HISTORY. THERE ARE 6 POSSIBLE COMBINATIONS WHERE THE OUTER WEB MUST BE EQUAL TO OR GREATER
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*PROPELLANTS
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*PROPELLER BLADES

A SUBMARINE USING TANDEM, LARGE HUB-TO-DIAMETER RATIO PROPELLERS WHOSE BLADES CAN BE PITCHED BOTH COLLECTIVELY AND CYCLICLY.
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*PROPELLING CHARGES

EFFECTS OF MOLDED REINFORCED PHENOLIC MATERIALS AND STRUCTURE ON IMPACT CHARACTERISTICS OF XMB CLOSING PLUG FOR 120 MM T82 PROPELLING CHARGE. A CLOSING PLUG MADE OF A CHOPPED COTTON FABRIC REINFORCED PHENOLIC MATERIALS WAS CONSIDERED TO MOST NEARLY MEET DESIGN AND DEVELOPMENT OBJECTIVES.
AD-285 063 DIV. 22

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PROPERDIN LITERATURE IS REVIEWED. ITS ISOLATION, ASSAY, PHYSICAL AND CHEMICAL PROPERTIES, AND INTERACTIONS WITH POLYSACCHARIDES, BACTERIA, VIRUSES, NEOPLASMS AND RADIATION ARE DISCUSSED. 128 REFERENCES.
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***PROPULSION**

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ANNUAL PROGRESS REPORT OF PROSTHETICS RESEARCH AT WALTER REED ARMY MEDICAL CENTER.
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A LITERATURE REVIEW OF MATHEMATICAL THEORIES IN PERFORMANCE, DECISION MAKING, AND LEARNING FROM 1930-1959. RESTRICTED TO INFORMATION THEORY, GAME AND DECISION THEORY, AND PROBABILISTIC LEARNING THEORIES.
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VALIDATION OF PERSONALITY TESTS AS MEASURES OF TRAIT-RATING FACTORS. THREE FORCED-CHOICE SELF-REPORT TESTS TO DEVELOP EMPIRICAL SCALES PREDICTIVE OF PEER-NOMINATION PERSONALITY RATINGS FROM THE SAME GROUPS. DETECTION KEYS FOR FAKED PERFORMANCES.
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DIMENSIONS OF STIMULUS SITUATIONS WHICH ACCOUNT FOR BEHAVIOR VARIANCE. SITUATIONS WHICH CANNOT BE PREDICTED BY PERSONALITY TRAITS AND APTITUDES. A TAXONOMY OF SITUATIONAL VARIABLES TO ACCOUNT FOR BEHAVIORAL VARIANCE.
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***PULSE GENERATORS**

A HIGH TEMPERATURE PULSE FORMING NETWORK FOR USE IN RADAR MODULATORS WHICH, WHEN IT FAILED, WOULD NOT GENERATE HYDROGEN OR OTHER HAZARDOUS GASES.
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THE QUANTIZATION OF GEOMETRY. THE THEORY OF GRAVITY.
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TEN PAPERS ARE PRESENTED ON VARIOUS QUANTUM MECHANICAL APPLICATIONS TO CLASSICAL PERTURBATION THEORY.
AD-285 291 DIV. 25

A SHORT SYNOPSIS OF THE QUANTUM FIELD THEORY IS PRESENTED.
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AN ANALYSIS IS PRESENTED ON RENORMALIZATION GROUP.
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ATOMIC COLLISIONS. THE PROBLEM OF ELECTRON EXCHANGE IN H -H COLLISION WAS INVESTIGATED. CALCULATION BY THE METHOD OF DISTORTED WAVES GIVES ENERGIES WHICH AGREE EXACTLY WITH 6 EXPERIMENTALLY DETERMINED RESONANCES IN THE RANGE 0.5 TO 50 KEV.
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SUMMARIES OF 4 PAPERS ON PROGRESS IN THE QUANTUM THEORY OF MANY-ELECTRON SYSTEMS.
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COMPRESSION-SET BEHAVIOR OF IRRADIATED ELASTOMERS. EXPERIMENTAL DATA WHICH EXTENDED OVER 5 LOGARITHMIC DECADES OF DOSE ARE WELL INTERPRETED BY AN EMPIRICAL EQUATION.
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MODIFIED WAGON WHEEL GRAIN DESIGN W SUB 1 GREATER THAN W SUB 2 + W SUB 3; W SUB 1 + W SUB 2 GREATER THAN W SUB 3; W SUB 1 + W SUB 3 GREATER THAN W SUB 2. A WAGON WHEEL GRAIN DESIGN MODIFICATION IS CONSIDERED IN WHICH SHORT SPEARS OR SPOKES OF PROPELLANT ALTERNATE WITH LONGER ONES; 3 DIFFERENT WEBS GIVE RISE TO A 3-LEVEL SURFACE-TIME HISTORY. THERE ARE 6 POSSIBLE COMBINATIONS WHERE THE OUTER WEB MUST BE EQUAL TO OR GREATER than the other two.
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*STEEL
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EXPERIMENTAL STUDY OF REPEATED BLAST LOADING EFFECTS ON STRUCTURAL ELEMENTS. ALL SPECIMENS WERE FABRICATED FROM STRUCTURAL STEEL. IT WAS CONCLUDED THAT ELEMENTARY THEORETICAL PROCEDURES FOR STRUCTURAL DAMAGE PREDICTION ARE ADEQUATE FOR THIS TYPE OF DAMAGE ASSESSMENT.
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*TITANIUM ALLOYS
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*TITANIUM COMPOUNDS

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*TOPOLOGY

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THE TERMINOLOGY, SYMBOLOGY, AXIOMS AND SOME PRINCIPAL THEOREMS OF SET THEORY ARE PRESENTED. ALSO INCLUDED IS THE APPLICATION OF SET THEORY TO PROBABILITY THEORY.
AD-285 310 DIV. 15

*TORQUE

THE EFFECT OF BENDING DISTORTION OF THE CROSS-SECTION ON THE TORSIONAL MODES AND FREQUENCIES OF A UNIFORM RECTANGULAR PLATE IS CONSIDERED.
AD-284 887 DIV. 25

*TOWERS

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*TOXIC AGENT ALARMS

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*TOXICITY

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*TRACKING

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*TRACKING
SURFACE TARGETS

FIELD TEST OF SOLO (SELECTIVE OPTICAL LOCK-ON) MOUNTED IN AN HU-1 HELICOPTER: RESULTS INDICATE MODEL OF SOLO WOULD GENERALLY TRACK TO A 3 MIL RADIAL MAX ERROR ON SUCH TARGETS AS TANKS JEEPS, HELICOPTERS IN FLIGHT, PERSONNEL CARRIERS, SHRUBBERY, AND TREES.
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*TRAINING DEVICES

PROCUREMENT OF TRAINING EQUIPMENT FOR AIR FORCE BALLISTIC MISSILES AND MILITARY SPACE SYSTEMS. STANDARDIZED REQUIREMENTS FOR DEVELOPMENT AND ACQUISITION OF ALL TRAINING EQUIPMENT FOR AIR FORCE TRAINING PROGRAMS.
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*TRANSFORMATIONS (MATHEMATICS)

LINEAR OPERATOR THEORY IS SURVEYED AND APPLIED TO SOLVING EQUATIONS ABOUT PROBLEMS OF PHYSICAL SYSTEMS. ANALYSIS OF ELECTRICAL CIRCUITS IS USED AS A VEHICLE TO DEMONSTRATE THE PRESENTATION.
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*TRANSISTOR AMPLIFIERS

A SOLID STATE INTERMEDIATE POWER AMPLIFIER CAPABLE OF DELIVERING RF POWER OUTPUT OF TWO WATTS TO THE FINAL STAGE OF THE AN/GRC-109 TRANSMITTER COVERING THE 220 - 700 MC FREQUENCY RANGE.
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*TRANSISTORS

THEORETICAL AND EXPERIMENTAL STUDIES RELATING TO MECHANISMS OF FAILURE OF SEMICONDUCTOR DEVICES.
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THEORETICAL ANALYSIS TO PROVIDE AN UNDERSTANDING OF THE NONLINEAR BEHAVIOR AND SPURIOUS RESPONSE OF SOLID STATE COMPONENTS INCLUDING TRANSISTORS AND FERRITE DEVICES. INTERFERENCE EFFECTS IN PARTICULAR CIRCUITS ARE ESTIMATED.
AD-285 224 DIV. 8

PRODUCTION ENGINEERING MEASURE FOR PROCESSES APPLICABLE TO THE ELECTROCHEMICAL ETCHED TRANSISTORS. TO DESIGN, CONSTRUCT, AND PROVE-IN SEMI-AUTOMATIC PRODUCTION EQUIPMENT WITH A CAPABILITY OF PARTS PRODUCTION DIRECTED TOWARDS A RATE OF AT LEAST 600 TRANSISTORS PER 8 HOUR DAY.
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*TRANSISTORS
PRODUCTION

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*TRANSMISSION LINES

MILLIMETER AND SUBMILLIMETER WAVE RECEIVER TECHNIQUES INCLUDING NEW ELECTROMAGNETIC DETECTION TECHNIQUES, PHYSICS PHENOMENA FOR DETECTOR APPLICATION, TRANSMISSION LINES AND TRANSMISSION LINE COMPONENTS.
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*TRANSPLANTATION

THE EFFECTS OF HORMONES, SERIAL TRANSPLANTATION, AND THYMECTOMY ON PANCREAS TRANSPLANTS, THE EFFECTS OF ALLOXAN-INDUCED DIABETES AND PANCREAS IMPLANTS ON BLOOD CHEMISTRY, AND THE DAMAGE TO THE EXOCRINE PANCREAS PRODUCED BY DL-ETHIONINE ARE STUDIED IN HAMSTERS.
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*TRANSPORT PLANES

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*TRANSPORT PLANES
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*TRANSPORTATION

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*TRAUMATIC SHOCK

CORONARY BLOOD FLOW AND CARDIAC OUTPUT DETERMINATIONS IN HYPOVOLEMIC SHOCK PATIENTS AND BLOOD VOLUME AND HEMATOCRIT MEASUREMENTS IN HUMANS BEFORE AND AFTER CARDIOVASCULAR SURGERY AND IN DOGS BEFORE AND AFTER SPLENECTOMY, BLOOD VESSEL LIGATION, EVISCERATION, HEMORRHAGE, ETC. WERE REPORTED AND THEIR SIGNIFICANCE DISCUSSED.
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*TRAVELING WAVE TUBES

NOISE MEASUREMENTS NEAR THE CARRIER OF A V-217 REFLEX KLYSTRON. SELF- AND CROSS-SPECTRA OF THE FREQUENCY MODULATION AND BEAM CURRENT NOISE OF TWO VA 161'S AND ONE QK 610 BACKWARD WAVE OSCILLATORS.
AD-284 788 DIV. 8

THEORY OF TRAVELING-WAVE TUBES AND AN ANALYSIS OF BACKWARD-WAVE OSCILLATORS.
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AN UNEXPECTED EFFECT IN AN EXPERIMENTAL TRANSVERSE WAVE TUBE. GAIN IN EXCESS OF 30 DB WAS OBSERVED IN A LONG METALLIC DRIFT TUBE CONSISTING OF TWO CUCCIA-COUPLERS.
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*TRIANGULAR WINGS
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*TRIODES

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*TUNGSTEN

EVALUATION OF TUNGSTEN TO GRAPHITE CARBIDE BASED BONDS WITH RESPECT TO STRENGTH VS. TEMPERATURE, THERMAL SHOCK RESISTANCE AND THERMAL CONDUCTIVITY AT HIGH TEMPERATURES.
AD-285 214 DIV. 14

*TUNGSTEN
OXIDATION

OXIDATION OF W AND W BASED ALLOYS. RATES OF OXIDATION OF W WERE DETERMINED BETWEEN 1150 AND 1615 C IN O PRESSURES OF 2 TO 100 TORR. VERY HIGH OXIDATION RATES OR SURFACE RECESSION RATES OCCURRED ABOVE 1200 C. OXIDATION OF 50 W/O TA-W ALLOY WAS STUDIED BETWEEN 1068 AND 1498 C AT 152 TORR O PRESSURE! A PROTECTIVE COAT WAS FORMED OVER THIS ALLOY.
AD-285 588 DIV. 17

•TUNGSTEN ALLOYS

MICROSTRUCTURE, HOT HARDNESS, AND EXTRUSION CONSTANTS FOR MO-, MO-W, AND W-BASE ALLOYS. CARBON SYNERGISM STUDIED FOR MO-3% TI-0.5% ZR AND MO-25% W-1.25% TI-0.1% ZR.
AD-284 832 DIV. 17

EXTRUSION OF TANTALUM AND TUNGSTEN ALLOYS WITH EXTRUSION PRESSURES EXCEEDING 180,000 PSI.
AD-285 316 DIV. 17

•TUNGSTEN ALLOYS
OXIDATION

OXIDATION OF W AND W BASED ALLOYS. RATES OF OXIDATION OF W WERE DETERMINED BETWEEN 1150 AND 1615 C IN O PRESSURES OF 2 TO 100 TORR. VERY HIGH OXIDATION RATES OR SURFACE RECESSION RATES OCCURRED ABOVE 1200 C. OXIDATION OF 50 W/O TA-W ALLOY WAS STUDIED BETWEEN 1068 AND 1455 C AT 152 TORR O PRESSURE; A PROTECTIVE COAT WAS FORMED OVER THIS ALLOY.
AD-285 988 DIV. 17

•TUNGSTEN ALLOYS
PREPARATION

DEVELOPMENT OF TA-W ALLOYS FOR HIGH PERFORMANCE PROPULSION ROCKET MOTOR NOZZLE COMPONENTS; CARBURIZATION AND SEGRE.
AD-285 167 DIV. 17

•TUNGSTEN COMPOUNDS

HIGH TEMPERATURE APPLICATION OF INTERMETALLIC BERYLLIDES AND SILICIDES (800 TO 3000 F). TERNARY MIXTURES OF BE AND SI WITH MO, NB, TA, W OR ZR; OXIDATION RESISTANCE STUDIES.
AD-284 985 DIV. 14

•TURBULENCE

SONIC ANEMOMETER DATA ACQUISITION AND ANALYSIS SYSTEM. CALCULATION OF EULERIAN SCALE OF TURBULENCE FROM BIVANE DATA.
AD-284 969 DIV. 30

•TURBULENT FLOW

MATHEMATICAL FORMULATION OF THE DISTRIBUTION OF WIND, TEMPERATURE, HUMIDITY AND THE TURBULENCE COEFFICIENT IN THE BOUNDARY LAYER OF THE ATMOSPHERE UNDER STATIONARY CONDITIONS.
AD-284 766 DIV. 2

•ULTRASONICS

THE HYDROLYSIS OF KCN BY ULTRASONIC ABSORPTION. SPHERICAL RESONATOR METHOD AND STATISTICAL REVERBERATION METHOD.
AD-285 432 DIV. 4

•ULTRAVIOLET RADIATION

ULTRAVIOLET SKY AND SUN/SKY RADIATION UNDER VARIOUS CONDITIONS AT 1590 M A.S.L.
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•ULTRAVIOLET SPECTROSCOPY

MEASUREMENT OF INFRARED, VISIBLE AND ULTRAVIOLET SPECTRA OF MOLYBDENUM COMPLEXES.
AD-284 627 DIV. 4

ULTRAVIOLET SKY AND SUN/SKY RADIATION UNDER VARIOUS CONDITIONS AT 1590 M A.S.L.
AD-285 061 DIV. 25

•UNDERWATER

STUDY OF THE EFFECT OF THICKNESS ON THE PROPERTIES OF LAMINATES FOR UNDERWATER PRESSURE VESSELS.
AD-284 932 DIV. 14

STUDY OF THE EFFECTS OF THICKNESS ON THE PHYSICAL AND MECHANICAL PROPERTIES OF LAMINATES FOR UNDERWATER PRESSURE VESSELS.
AD-284 839 DIV. 14

•UNDERWATER SOUND

STATISTICAL TESTS FOR NORMALITY APPLIED TO EXPERIMENTAL DATA FOR A LIMITED NUMBER OF SAMPLES OF LOW FREQUENCY SEA NOISE.
AD-284 944 DIV. 25

•UNDERWATER SOUND EQUIPMENT
INTERFERENCE

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•UNIVERSITIES

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•URANIUM COMPOUNDS

PROTON MAGNETIC RESONANCE STUDIES OF POLYCRYSTALLINE URANIUM OXIDE HYDRATES. CHEMICAL BEHAVIOR.
AD-284 852 DIV. 25

•URETHANES

THE EFFECT OF JP-4 JET FUEL AND HYDRAULIC FLUID ON POLYURETHANE INSULATION.
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EFFECT OF JP-4 JET FUEL ON POLYURETHANE INSULATION.
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•URINE

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AD-284 564 DIV. 16

•URINE
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WATER RECOVERY FROM PHYSIOLOGICAL SOURCES FOR SPACE APPLICATIONS. THE VACUUM PYROLYSIS METHOD WAS CONSIDERED OPERATIONALLY MORE ADVANCED THAN OTHER METHODS TESTED.
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•USSR
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•USSR
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•VAN ALLEN RADIATION BELT
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•VARIABLE PITCH PROPELLERS

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•VELOCITY

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•VERBAL BEHAVIOR

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•VERTICAL TAKE-OFF PLANES
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•VERTICAL TAKE-OFF PLANES
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•VIBRATION

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THE VIBRATIONS IN THE PANELS OF THE AIRFRAME OF A CARAVELLE TEST SECTION EXCITED BY JET ENGINE NOISE WERE STUDIED.
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•VIBRATION
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•VIBRATION ISOLATORS

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•VIRUS DISEASES

SURVEILLANCE OF PROBABLE HOSTS AND VECTORS OF EASTERN ENCEPHALITIS VIRUS INCLUDING THE SCREENING OF SPECIMENS IN 3-WEEK-OLD MICE FOR INDICATIONS OF VIREMIA AND HOLDING OF ARTHROPOD SPECIMENS AND SERUM FRACTIONS FOR CONFIRMATORY STUDIES.
AD-285 323 DIV. 16

•VISCOSITY

AVISCOELASTIC PROPERTIES OF CROSSLINKED POLY(ETHYLENE TETRASULFIDE).
AD-284 785 DIV. 14

•VISION

DECAY FUNCTION OF A PERSISTING VISUAL SENSATION. CURVES FOR THE PHOTOPIC INTENSITY LEVELS AND TWO STIMULUS DURATIONS. A METHOD WHICH INVOLVES FINDING THE CRITICAL INTERVAL BETWEEN TWO SUCCESSIVE FLASHES OF LIGHT.
AD-284 977 DIV. 28

•VISUAL ACUITY
TEST EQUIPMENT

ARMED FORCES VISION TESTER WAS USED IN TESTS OF VISUAL ACUITY UNDER VIEWING CONDITIONS INVOLVING COMBINATIONS OF GRAVITY EFFECTS. TWENTY-FOUR SUBJECTS WERE TESTED FOR LEFT, RIGHT, AND BINOCULAR ACUITY OF NEAR AND FAR VISION IN EACH OF FOUR BODY POSITIONS.
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•VISUAL AFTER IMAGES

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AD-284 977 DIV. 28

•VISUAL PERCEPTION

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AD-285 498 DIV. 28

•VISUAL PERCEPTION
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•VITAMIN A

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•VOCABULARY

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*VOLTAGE
HYDROGEN

HYDROGEN OVERVOLTAGE ON GOLD POLYCRYSTALLINE AND SINGLE CRYSTAL CATHODES IN 0.1 M PERCHLORIC ACID SOLUTIONS IN A C. D. RANGE UP TO 200 A/M(2). THE TAFEL LAW HOLDS TRUE, BUT 2 DIFFERENT SLOPES ARE OBSERVED. THAT IN THE LOWER C. D. RANGE HAVING THE SMALLEST VALUE.
AD-284 600 DIV. 8

*VOLTAGE
MEASUREMENT

ATTAINING AND MEASURING HIGH AND SUPERHIGH VOLTAGES. INCLUDES LABORATORY INSTALLATIONS AND MEASUREMENT METHODS. USSR TRANSLATION.
AD-284 876 DIV. 7

*VOLTAGE
TEST EQUIPMENT

ATTAINING AND MEASURING HIGH AND SUPERHIGH VOLTAGES. INCLUDES LABORATORY INSTALLATIONS AND MEASUREMENT METHODS. USSR TRANSLATION.
AD-284 876 DIV. 7

*VULCANIZATES

COMPRESSION-SET BEHAVIOR OF IRRADIATED ELASTOMERS. EXPERIMENTAL DATA WHICH EXTENDED OVER 5 LOGARITHMIC DECADES OF DOSE ARE WELL INTERPRETED BY AN EMPIRICAL EQUATION.
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*WAKE

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*WATER

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AD-285 302 DIV. 14

*WATER
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WATER RECOVERY FROM PHYSIOLOGICAL SOURCES FOR SPACE APPLICATIONS. THE VACUUM PYROLYSIS METHOD WAS CONSIDERED OPERATIONALLY MORE ADVANCED THAN OTHER METHODS TESTED.
AD-285 330 DIV. 16

*WATER TUNNELS

PROBLEMS OF SYMMETRICAL TWO-DIMENSIONAL SUPERCAVITATING FLOW ABOUT A THIN WEDGE IN A FINITE FLUID WITH TWO PARALLEL SOLID BOUNDARIES ARE SOLVED.
AD-285 530 DIV. 9

A DISPLACEMENT TYPE DYNAMOMETER FOR THE TWO-DIMENSIONAL, FREE-JET WATER TUNNEL TEST SECTION, WHICH HAS GIVEN SATISFACTORY SERVICE FOR ONE YEAR, IS DESCRIBED.
AD-285 531 DIV. 9

*WATER VAPOR

BASIC SPECTRAL DATA FOR THE ROTATION BAND OF WATER VAPOR: WATER VAPOR LINE WIDTHS. BASIC SPECTRAL DATA FROM ZERO TO THE 1/1000 CM REGION.
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*WAVE CHARACTERISTICS
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*WAVE TRANSMISSION

BASIC SPECTRAL DATA FOR THE ROTATION BAND OF WATER VAPOR: WATER VAPOR LINE WIDTHS. BASIC SPECTRAL DATA FROM ZERO TO THE 1/1000 CM REGION.
AD-285 181 DIV. 25

*WAVEFORM GENERATORS

A HIGH TEMPERATURE PULSE FORMING NETWORK FOR USE IN RADAR MODULATORS WHICH, WHEN IT FAILED, WOULD NOT GENERATE HYDROGEN OR OTHER HAZARDOUS GASES.
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*WAVEGUIDES

HIGH POWER CAPABILITIES OF WAVEGUIDE SYSTEMS. FAILURES AT ULTRA-HIGH POWER LEVELS WHERE HIGH AVERAGE AS WELL AS HIGH PEAK POWER BECOME LIMITING FACTORS.
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*WEAPONS
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*WEATHER FORECASTING

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*WEATHER FORECASTING
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*WEATHER FORECASTING
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*WEATHER STATIONS

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*WEATHER STATIONS
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AD-285 594 DIV. 2

*WEDGES

PROBLEMS OF SYMMETRICAL TWO-DIMENSIONAL SUPERCAVITATING FLOW ABOUT A THIN WEDGE IN A FINITE FLUID WITH TWO PARALLEL SOLID BOUNDARIES ARE SOLVED.
AD-285 530 DIV. 9

*WEIGHTLESSNESS

OPERATION OF PUSH-BUTTON, TOGGLE, AND ROTARY SWITCHES DURING WEIGHTLESSNESS. LEAST DECREMENT WITH ROTARY SWITCH AND GREATEST WITH TOGGLE SWITCH. PUSH-BUTTON SWITCH MOST RAPID IN BOTH 1-G AND 0-G CONDITIONS.
AD-285 549 DIV. 28

*WELDING

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*WIND
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*WIND
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*X-RAY DIFFRACTION ANALYSIS

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AD-285 043 DIV. 25

*X-RAY PHOTOGRAPHY

A MATHEMATICAL EXPRESSION HAS DEVELOPED WHICH RELATES THE EQUIVALENCY BETWEEN DIFFERENT PENETRAMETERS TYPES.
AD-285 409 DIV. 17

*X-RAY SPECTRUM

THE DEVELOPMENT AND APPLICATION OF A PRECISION VACUUM SPECTROGRAPH FOR THE SOFT X-RAY REGION (15 TO 50 A).
AD-284 883 DIV. 25

*YTTRIUM

LINE WIDTH MEASUREMENT ON SINGLE CRYSTAL YTTRIUM-IRON GARNET.
AD-285 272 DIV. 25

*YTTRIUM COMPOUNDS

PHASE RELATIONSHIPS FOR Y-FE GARNETS IN THE LIQUIDUS RANGE UNDER DIFFERENT O2 PARTIAL PRESSURES. CRYSTAL GROWTH METHODS.
AD-284 810 DIV. 25

*ZIRCONIUM COMPOUNDS

HIGH TEMPERATURE APPLICATION OF INTERMETALLIC BERYLLIDES AND SILICIDES (800 TO 3000 F). TERNARY MIXTURES OF BE AND SI WITH MO, NB, TA, W OR ZR: OXIDATION RESISTANCE STUDIES.
AD-284 945 DIV. 14

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-284 597 Div. 1, 12
(TISTA/SEB) OTS price $3.00

North American Aviation, Inc., Los Angeles, Calif.
ESTABLISHMENT OF THE APPROACH TO, AND DEVELOPMENT OF, INTERIM DESIGN CRITERIA FOR SONIC FATIGUE.
Final rept., 15 Jan 61-15 Jan 62 on Dynamic Problems in Flight Vehicles,
by G. E. Fitch, T. R. Dutko and others. June 62, 154p. incl. illus. tables, 46 refs.
(Contract AF 33(616)7694, Proj. 1370)
(ASD TDR 62-26) Unclassified report

DESCRIPTORS: *Fatigue (Mechanics), Structures, Frequency, Vibration, Theory, Mathematical analysis, Noise, Rocket motor noise, Jet engine noise, Failure (Mechanics), Pressure, Life expectancy, Stresses, Jet fighters, Jet bombers, Transport planes, Target drones, Helicopters, Aircraft, Airplanes, Rockets, Guided missiles, Reliability, Load distribution, Jet planes, Airframes, Sound.

Design criteria for sonic fatigue were developed. The approach selected was accelerated, discrete frequency life-testing, the results of which are interpreted using a sine-random equivalence analysis. This approach offers the best compromise between economy, accuracy, and lead time to cover structural design problems for advanced design, design development, and prooftesting of completed vehicle structure. Methods were extracted from the literature with which to predict the acoustic environment and determine the duration of various environments from mission analysis. Fatigue data and an examination of cumulative damage are presented in support of the sine-random equivalence technique. This method takes advantage of the extensive fatigue S-N data availabe in the industry. Examples of the application of the analytical-empirical techniques are presented. (Author)

AD-284 609 Div. 1, 26, 33
(TISTA/VGW) OTS price $2.60

Republic Aviation Corp., Farmingdale, N. Y.
CONTAINER, FREE DROP, MAP AND PHOTO.
Final rept., 12 Feb-30 Sep 60.
30 Sep 60, 15p. illus.
(Contract DA 19-129-qm-1529)
Unclassified report

DESCRIPTORS: *Containers, Design, Flight testing, Effectiveness, Aerodynamics, Maps, Photographs, Stability, Air drop operations.

The design, fabrication and flight testing of a series of containers for dropping maps and photos from a flying aircraft to the ground are reported. The initial aerodynamic container design produced unpredictable flight stability patterns. Stability was found to be dependent upon flight attitude and forward speed at the point of release as well as the distance between the center-of-drag and the center-of-gravity of the unit. The balance of the program reinforced this deduction. The materials of construction evaluated in this program proved to be acceptable. (Author)

AD-284 626 Div. 1, 2, 14
(TISTM/REB) OTS price $4.60

Kaysam Corp. of America, Paterson, N. J.
STUDY OF PHYSICAL AND CHEMICAL CHARACTERISTICS OF BALLOONS AND BALLOON MATERIALS.
Quarterly progress rept. no. 1, 25 Apr-24 July 62,
by Eric Nelson, ed. by John Kantor. 24 July 62, 43p. tables. (Rept. no. 9)
(Contract DA 36-039-sc-90747, Proj. 3M36-21-001-04)
Unclassified report

DESCRIPTORS: *Balloons, *Meteorological balloons, *Buoyant materials, Materials, Polymers, Synthetic rubber, Plasticizers, Films, Flight testing, Mechanical properties, Tensile properties, High altitude.

A literature study revealed a new curing system for Neoprene which enables high elongation without high-temperature cures. Thiocarbanilide was evaluated as an accelerator to provide room temperature cores. One compound in a series of compounds had an elongation of 820% at -40 C and 1200% at room temperature. A second compound had high modulus associated with elongation at room temperature and -40 C. Flights were conducted with 2500-gram balloons. These averaged about 130,000 ft and were extremely consistent in performance.

AD-284 648 Div. 1
(TISTA/GEC) OTS price $1.10

Beech Aircraft Corp., Wichita, Kans.
PROTOTYPE DEVELOPMENT MODEL 385 AIR REFUELING STORE.
Interim rept. no. 27, 1-31 Aug 62,
by C. V. Lassmann. 7 Sep 62, 4p. (Engineering rept. no. 4502)
(Contract NOw 60-0060-c)
Unclassified report

DESCRIPTORS: *Aeronautical booms, *Refueling in flight, Airplane protuberances, Fuel systems, Fuel hose, Towed bodies, Jet fighters, Research program administration, Costs, Design.

Development of the Beech Model 385 Air Refueling Store was continued. A basic configuration was established; work is in process on detail design and developmental testing. Progress was achieved toward resumption of flight testing of the prototype store; however, no definite testing schedule was established. It is recommended that additional flight test stores be manufactured. (Author)

AD-284 861 Div. 1
(TISTA/GEC) OTS price $1.60

Naval Air Test Center, Patuxent River, Md.
DETERMINATION OF A3D ANGLE OF ATTACK SETTING FOR

CARRIER APPROACH.
Rept. no. 1 (Final),
by A. A. Smith, Jr. and D. G. Fraasa. 31 Aug 62, 6p. illus. (Proj. RSSH 44-87; Serial no. FT2222-265)
(WEPTASK RA1200001/201 1/F012-15-002)
Unclassified report

DESCRIPTORS: *Attack bombers, Angle of attack indicators, Jet bombers, Effectiveness, Glide path systems, Flight paths, Carrier landings.

The optimum approach angle of attack (AOA) was determined for the model A3D airplane and operational inconsistencies with a standardized approach AOA were investigated. A standardized approach AOA is not feasible until Airstream Direction Detector orientation with respect to the wing is standardized. Numerous AOA system maintenance discrepancies are noted. Recommendations are made concerning present use of the AOA system, eventual standardization of approach AOA and improved system maintenance. (Author)

AD-284 869 Div. 1, 2
(TISTA/VGW) OTS price $10.10

Winzen Research Inst., Minneapolis, Minn.
BALLOON DEVELOPMENT AND UNIVERSITY OF CHICAGO NUCLEAR EMULSION FLIGHT PROGRAMS.
Final rept.
31 Aug 62, 128p. incl. illus. tables (Rept. no. 1269-R)
(Contract Nonr-146011)
Unclassified report

DESCRIPTORS: *Meteorological balloons, High altitude, Flight testing, Flight paths, Cosmic rays, Measurement, Polymers, Ethylenes, Effectiveness, Design.

The development is described of a balloon capable of carrying a 1500 pound scientific payload to an altitude of 120,000 feet for a minimum duration of 24 hours. Flights utilizing the balloon for carrying the University of Chicago's nuclear emulsion payload are summarized. The resultant balloon design was a natural shaped balloon with a volume of ten million cubic feet featuring a cap, essentially double wall construction, extending down from the apex for a distance of 200 feet. The balloon shell and cap were initially constructed from 1 mil and 1.5 mil polyethylene, respectively, and reinforced with 500 pound fortican load bands. The design was later modified by reducing the cap material to 1 mil and the length of the cap to 120 feet. The test program consisted of conducting a static ground inflation test to establish the maximum permissible inflation and one test flight with a simulated scientific payload. Balloon performance appeared to be satisfactory. (Author)

AD-284 870 Div. 1, 2
(TISTA/VGW) OTS price $1.60

Winzen Research, Inc., Minneapolis, Minn.
PROJECT SKYHOOK.
Progress rept., 1 Jan-31 Dec 61,
by Robert M. Enderson. 31 Aug 62, 15p. incl. illus. tables (Rept. no. 1270-R)
(Contract Nonr-146010)
Unclassified report

DESCRIPTORS: *Balloons, Meteorological balloons, Flight testing, Flight paths, Cosmic rays, Measurement, Cloud chambers, High altitude, Design.

A summary of three 'Skyhook' balloon flights is given followed by detailed flight reports of each flight. The scientific objective was satisfied on each flight. Balloon performance on each flight was good although the time altitude curve of Flight 890 shows a very slow descent starting approximately two hours after launch. In approximately ten hours the balloon descended from 118,000 to 104,000 feet. A small hole in the balloon, which is understandable in consideration of the 1/2 mil polyethylene shell, could account for the slow descent. Operational and launch problems encountered on the flights are outlined. (Author)

AD-284 911 Div. 1
(TISTA/SEB) OTS price $10.10

Naval Ordnance Lab., White Oak, Md.
A COMPILATION OF AERODYNAMIC NOMENCLATURE AND AXES SYSTEMS,
by John Wright. Aug 62, 1v. incl. illus. tables (Rept. no. NOLR 1241)
Unclassified report

DESCRIPTORS: *Aerodynamics, Stability, Equations, Moments, Damping, Yaw, Pitch, Roll, Motion, Dynamics, Dictionaries.

A compilation of aerodynamic nomenclature and axes systems is presented. The primary and secondary (subscript and superscript) symbols and aerodynamic coefficients are treated in detail. The body-, stability-, wind-, aeroballistic-, and tunnel-axes systems are defined and presented pictorially. Transfer equations from the body-axes system to the other systems together with their derivations are included. (Author)

AD-285 144 Div. 1
(TISTA/GEC) OTS price $8.60

Courtney and Co., Philadelphia, Pa.
AN ACTIVITY ANALYSIS OF THE POSITIONS IN A HIGH ACTIVITY FLIGHT SERVICE STATION,
by Robert H. Kerle, Anthony W. Silvestro and Wallace H. Wallace. Sep 61, 79p. incl. illus. tables, refs. (Rept. no. 38)
(Contract FAA/BRD-40)
Unclassified report

DESCRIPTORS: *Airports, *Air force operations, *Management engineering, Analysis, Statistical analysis, Air traffic control systems, Communications, Operations research, Aviation personnel, Air traffic controllers, Weather communications.

An activity analysis in a high activity Flight Service Station (Millville) was performed to describe in detail the duties of operating specialists. Data were collected by continuous 4-hr kymograph recordings of both the Air/ground, or A Position, and the Interphone, or B Position, under both moderate and high load conditions. The records were analyzed to determine the frequency and duration of each of the specialists' activities and what percentage of time they required. Diary data on the non-control position, the Teletype or C Position, were also collected. These observations were supplemented by intensive interviews with the operating personnel in Millville and other Flight Service Stations. Process charts were prepared showing the flow of information between the station with other facilities and the aircraft for 4 of the stations' principal functions: information relay, preflight and in-flight briefing, weather information dissemination, and emergency assistance. Findings indicated that the workload was directly related to the number of reports rather than to the number of aircraft in the area and that probably excessive delays occurred during the high load, IFR conditions. (Author)

AD-285 498 Div. 1
(TISTA/GEC) OTS price $1.60

Naval Air Test Center, Patuxent River, Md.
DETERMINATION OF TAKE-OFF PERFORMANCE FOR THE AD-5W AIRPLANE WITH R3350-26WB/C/D ENGINE.
Final rept.,
by J. F. Owens and K. W. Weir. 27 Aug 62, 17p. incl. illus. (Serial no. FT212-260)
Unclassified report

DESCRIPTORS: *Attack bombers, Take-off, Airplane engines, Naval aircraft, Air speed, Operation, Effectiveness, Loading, Flight testing.

Field take-off tests for the AD-5W airplane with an R3350-26WD engine were conducted to obtain take-off performance with the current take-off engine configuration of 2900 RPM, 28 degrees BTC ignition timing, and 2700 Brake Horsepower (BHP) and a proposed engine configuration of 2800 RPM, 24 degrees BTC ignition timing, and 2700 BHP. All tests were conducted with a modified Manifold Absolute Pressure (MAP) limit of 57 in. Hg since the test airplane would not develop 2700 BHP at the current standard day MAP limit of 55 in. Hg. Take-off distances are unchanged by the use of the proposed engine configuration. Engine operation with the proposed engine configuration is satisfactory for take-off. Take-off distance data presented in the Flight Handbook can be obtained with either engine configuration; however, the take-off indicated airspeed required to obtain this distance is lower than that presented. (Author)

AD-285 502 Div. 1
(TISTA/GEC) OTS price $5.60

Aeronautical Instruments Lab., Naval Air Development Center, Johnsville, Pa.
REPORT ON TEST METHODS FOR THE SINGLE DEGREE OF FREEDOM INTEGRATING RATE GYRO. PHASE III. TIME VARIANT DRIFT CHARACTERISTICS,
by Ronald S. Vaughan. 1 May 62, 44p. incl. illus. tables, 7 refs. (Rept. no. NADC-AI-6242)
Unclassified report

DESCRIPTORS: *Gyroscopes, Test methods, Drift, Measurement, Analysis, Servo systems, Torque, Feedback, Navigation.

Several methods of characterizing time variant drifts were studied. The advantages of specifying short term and long term (day-to-day) measures are discussed, such as the auto-correlation function. Laboratory studies of the various methods of measuring drift indicate that the method of using the earth as a turntable has many advantages. A servo controlled stand is also required, particularly for gyros with very high mechanical gain, but is not as versatile a test instrument. Definitions of warm-up time are proposed which seem less arbitrary than those used by many sources. It is concluded that due to the various test methods in existence, and often due to the methods of analysis of test results, comparison of characteristics of gyros is difficult unless methods of test are specified. The methods contained in this report are applicable to single degree of freedom integrating rate gyros where testing is desired after completion of the finished unit. It is recommended that consideration be given to the acceptance of the methods described in this report as an approach to standardization of methods for determining the performance characteristics of single degree of freedom integrating rate gyros. (Author)

AD-285 556 Div. 1
(TISTA/GEC) OTS price $5.60

General Dynamics/Convair, San Diego, Calif.
DEVELOPMENT OF A HIGH-TEMPERATURE, NUCLEAR-RADIATION-RESISTANT PNEUMATIC POWER SYSTEM FOR FLIGHT VEHICLES.
Quarterly rept., 25 June-24 Sep 62.
24 Sep 62, 47p. incl. illus. tables, 3 refs.
(Rept. no. GDC 62-329)
(Contract AF 33(616)7582)
Unclassified report

DESCRIPTORS: *Control systems, *Pneumatic servomechanisms, *Auxiliary power plants, Compressors, Power supplies, Rotary compressors, Aircraft equipment, High pressure compressors, Pressure regulators, Bearings, Seals, High temperature research, Piston rings, Cylinder liners, Fracture (Mechanics), Safety valves, Pneumatic valves, Design, Servo systems, Control valves, Radiation effects, Aircraft, Nuclear propulsion, Hydraulic power system, Heat resistant alloys, Nickel alloys, Chromium alloys.

The development of a high-temperature, nuclear-radiation-resistant pneumatic power system for flight vehicles continued. Extreme thermal environments because of heat generated by supersonic speeds and/or the propulsion systems were considered and the design, development and testing of a typical pneumatic system capable of operating under wide temperature excursions while in the presence of nuclear radiation were undertaken. A ram air turbine-driven compressor was selected as the most feasible means of supplying the pneumatic power source. A rotary actuator and servo control valve, pressure regulator, relief valve, accumulator, filter, check valve, as well as miscellaneous hardware are also under development. These components will be tested as parts of a pneumatic system, under both high temperature and nuclear radiation environments. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-284 501 Div. 2
(TISTP/FR) OTS price $1.10

Air Force Cambridge Research Labs., Bedford, Mass.
BISTATIC LUNAR RADAR MEASUREMENTS OF LARGE SCALE VARIATIONS IN IONOSPHERIC ELECTRON CONTENT,
by G. N. Taylor, H. E. Whitney, and J. A. Klobuchar. May 62, 6p. incl. illus. tables, 5 refs. (AFCRL 62-360)
(Proj. 4643) Unclassified report

DESCRIPTORS: *Ionsphere, Electrons, Radar analysis, Radio signals, Very high frequency, Reflection, Moon.

Observing large-scale horizontal variations of ionospheric content from a single station is difficult because their effects are masked by those of day-to-day and seasonal variations. This difficulty can be obviated by receiving the lunar-reflected signals simultaneously at two widely separated stations. Results of such an experiment are reported. (Author)

AD-284 504 Div. 2
(TISTP/FR) OTS price $2.60

Florence U. (Italy).
RADAR-ECHO RATE FROM SHOWER METEORS. PART I:

THEORETICAL INVESTIGATION,
by N. Carrara, P. F. Checcacci and others.
10 Apr 60, 18p. incl. illus. 3 refs. (Technical note no. 1)
(Contract AF 61(052)592)
(AFCRL 62-546) Unclassified report

DESCRIPTORS: *Meteors, *Radar echo areas, Mathematical analysis.

Formulas are given for evaluating the number of meteor echoes revealed by a radar set, as a function of time and antenna bearing, in the case when the meteors belong to a shower. (Author)

AD-284 513 Div. 2, 30
(TISTP/JW) OTS price $9.60

Interagency Committee on Oceanography, Washington, D. C.
UNIVERSITY CURRICULA IN OCEANOGRAPHY - ACADEMIC YEAR 1962-63.
June 62, 111p. (ICO Pamphlet no. 6)
Unclassified report

DESCRIPTORS: *Oceanography, *Universities, Marine biology, Climatic factors, Directories, Training.

AD-284 517 Div. 2
(TISTP/FR) OTS price $1.10

Minnesota U., Minneapolis.
A SEARCH FOR FAINT BLUE STARS. XXI. PROPER MOTIONS FOR 150 FAINT STARS,
by Willem J. Luyten. 1962, 4p. incl. table.
(Contract Nonr-189200)
Unclassified report

DESCRIPTORS: *Stars, Celestial mechanics.

In paper XVII, proper motions were given for 101 blue stars found by Feige which stars are mainly brighter than magnitude 14. The present paper constitutes a continuation and gives motions for 150 stars largely in the Hyades, Ursa Major, and North Galactic Polar region, all stars being mainly fainter than magnitude 14. Almost none of the stars in the present paper appear in the Carte du Ciel Catalogue, and the old plate material therefore consisted almost entirely of the Harvard 16-inch MC plates (1 mm = 98.6) and 24-inch Bruce plates (1 mm = 59.2), while the new plates were almost entirely duplicate negatives of the Palomar-National Geographic Survey (1 mm = 67.1) with a sprinkling of Tonantzintla and Michigan Schmidt plates. (Author)

AD-284 518 Div. 2
(TISTP/FR) OTS price $1.10

Minnesota U., Minneapolis.
A SEARCH FOR FAINT BLUE STARS. XXIX. PROPER MOTIONS OF 121 FAR SOUTHERN BLUE STARS,
by Willem J. Luyten. 1 Mar 62, 7p. incl. table.
(Contract Nonr-189200)
Unclassified report

DESCRIPTORS: *Stars, Celestial mechanics.

In earlier papers, results were given of proper motion measures for some 250 faint blue stars, mainly in the North and South Galactic Pole region, and in the Hyades and Ursa Major regions. In order to attempt a better coverage of the sky with a view to solar motion determination, motions have now been measured for 121 similar stars in the region between 19 and 6 hours of right ascension, and south of declination -45. The blue stars in question have been published in papers XII and XVIII of the present series. The criteria for selection were, either that the star appear in the Cape, Sydney, or Melbourne astrographic catalogues or on a sufficient number of old Harvard plates to render the measured motions reliable. In all cases new plates taken with the Cordoba astrographic and sixty-inch telescopes were used for the most recent positions. (Author)

AD-284 593 Div. 2
(TISTP/FR) OTS price $1.10

Meteorology Research, Inc., Altadena, Calif.
STUDY OF CONTRAIL DATA EVALUATION.
Final rept., 15 Feb 60-30 Apr 62,
by T. B. Smith. 30 Apr 62, 9p. illus. (Rept. no. MR 162 FR-36)
(Contract AF 19(604)6652, Proj. 7695; Continuation of Contract AF 19(604)2038)
(AFCRL 62-474)
Unclassified report

DESCRIPTORS: *Condensation trails, Reduction, Photographic analysis, Meteorological data, Airplanes.

A program to analyze and evaluate results of B-47 contrail-suppression flights was established. Ground photos were taken with a vertically-pointing aerial camera, but most of the analyzable data came from crew members' in-flight reports. Difficulties in the analysis arose from three major sources: (1) operating problems with the suppression system, (2) lack of adequate knowledge of the supression agent flow rate, and (3) lack of ambient humidity data to use in computing trail liquid-water content. A rough plot of agent flow vs. trail liquid-water content shows that the flow rate of agent should be approximately 25% of the fuel flow rate by weight or 10% by volume in order to suppress a trail liquid water of .05 g/cubic meter. (Author)

AD-284 630 Div. 2
(TISTP/FR) OTS price $2.60

The Rand Corp., Santa Monica, Calif.
SOME IMPLICATIONS OF THE EARTH'S GRAVITATIONAL FIELD FOR THE INTERNAL STRUCTURE OF THE EARTH,
by D. Oberste-Lehn. Sep 62, 15p. incl. illus. tables, 5 refs. (Memo. no. RM-3247-PR)
(Contract AF 49(638)700)
Unclassified report

DESCRIPTORS: *Earth, *Gravity, Lithosphere, Density.

The configuration of the earth's potential field was determined from the orbits of near-earth satellites. This potential can be represented by a series expansion in spherical harmonics. The values of certain coefficients (J sub n) for terms in this series have been calculated. The J2 coefficient reflects the oblateness of the earth; the cause of the J3 coefficient was not established. The potential field can be expressed by surface gravity anomalies resulting from inhomogeneities in mass distribution within a body. Such differences in mass distribution exist between oceanic and continental areas within the crust and upper mantle over large areas of the earth's surface. Results are presented of an investigation of the gravitational fields of earth models performed to determine the nature of gravity anomalies to be expected from oceanic and continental areas. Using conventional crustal structure, the earth-model results indicate that a surface anomaly exists which is positive over continental blocks, and that its magnitude increases with increase in the assumed depth to isostatic compensation and with increase in positive topographic relief. Application of the earth-model anomaly to the actual distribution of continents and oceans results

in a calculated value for the gravitational anomaly which is of the same order of magnitude as, but of opposite sign to, that derived from satellite orbits. Conditions that might reconcile this discrepancy are presented. (Author)

AD-284 766 Div. 2
(TISTP/GRW) OTS price $1.10

American Meteorological Society, Boston, Mass.
THE STATEMENT OF THE PROBLEM OF THE STATIONARY STRUCTURE OF THE BOUNDARY LAYER OF THE ATMOSPHERE (Postanovka Zadachi o Statsionarnom Stroenii Pogranichnogo Sloia Atmosfery),
by D. L. Laikhtman, tr. by Myron Ricci. Nov 61, 9p. incl. illus. 7 refs. (Trans. no. T-R-378 from Glavnaia Geofizicheskaia Observatoriia Trudy, no. 94, pp. 3-7, 1960)
(Contract AF 19(604)6113)
Unclassified report

DESCRIPTORS: *Atmosphere, *Turbulent flow, Wind, Temperature, Humidity, Heat transfer, Mathematical analysis.

The overall problem of the distribution of wind, temperature, humidity and of the turbulence coefficient in the boundary layer of the atmosphere under stationary conditions is mathematically formulated. (Author)

AD-284 767 Div. 2
(TISTP/GRW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
LUNAR SURFACE FORMATIONS,
by M. M. Shemyakin. 4 Sep 62, 2p. incl. illus. (AID rept. no. 62-121; Trans. from On Some Patterns in the Distribution of Crater Chains in the Regions of Clavius and Hipparchus Cirques, Vsesoyuznoye Astronomo-Geodezicheskoye Obshchestvo, Byulleten' no. 30:37, pp. 33-38, 1962)
Unclassified report

DESCRIPTORS: *Extraterrestrial geography, *Moon, Surface properties.

AD-284 769 Div. 2
(TISTP/GRW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
HYPSOMETRIC MAP OF THE MOON,
by V. B. Neyman. 6 Sep 62, 3p. incl. illus. (AID rept. no. 62-123; Trans. from On the Nature of the Basic Lunar Formations, Vsesoyuznoye Astronomo-Geodezicheskoye Obshchestvo, Byulleten' no. 30:37, pp. 28-32, 1962)
Unclassified report

DESCRIPTORS: *Extraterrestrial geography, *Moon, Surface properties, Maps.

AD-284 812 Div. 2
(TISTP/TL) OTS price $3.60

Massachusetts Inst. of Tech., Cambridge.
RADAR MEASUREMENTS OF SEVERE STORMS IN NEW ENGLAND.
Final rept.,
by Pauline M. Austin. July 62, 35p. incl. illus. tables, refs.
(Contract AF 19(604)7462, Proj. 8622)
(AFCRL 62-835) Unclassified report

DESCRIPTORS: *Weatherforecasting, *Radar, *Storms, Hail, Measurement, Reflection, Numerical analysis, Statistical analysis, Instrumentation.

Two investigations concerning severe storms are presented. Basic data for both are iso-echo contours of the averaged, range-corrected signal, photographed from the PPI of a 10-cm radar. These quantitative measurements at a wavelength unaffected by rain attenuation are particularly suitable for the study of severe storms. A numerical investigation of New England squall lines was undertaken to provide a quantitative description which can be used for statistical analysis and as a basis for formulating and testing dynamic models. Eight squall lines are analyzed and three charts are plotted for each one: a total intensity chart which shows the rate at which water is being precipitated in the whole line as a function of time; a space composite showing the distribution of rain in a moving grid attached to the squal line; a time-space composite showing the distribution of rain along the line as a function of time. The use of a coordinate system attached to the line permitted investigation of changes in internal structure while eliminating effects produced by the motion of the line as a whole. The time scale was roughly the same for all the lines as were the motions and orientation with respect to the prevailing wind. Strong similarities in internal structure were noted. (Author)

AD-284 822 Div. 2
(TISTP/GRW) OTS price $4.60

Texas A. and M. Coll., College Station.
CRUISE 62-H-10, JULY 17-AUGUST 13, 1962, GALVESTON, TEXAS-KINGSTON, JAMAICA-NICARAGUA-HONDURAS SHELF.
Summary rept.
13 Aug 62, 41p. incl. illus. (Reference no. 62-15T)
(Contract Nonr-211904, Proj. NR 083-036)
Unclassified report

DESCRIPTORS: *Sedimentation, *Caribbean Sea, Oceanographic vessels, Oceanographical data, Measurement, Hydrographic surveying, Honduras, Nicaragua.

Cruise 62-H-10 was designed for collecting sediment samples from the broad continental shelf off the coasts of Nicaragua and Honduras. The oceanographic research vessel Hidalgo proceeded to the Nicaragua-Honduras shelf, where bottom samples were collected. The collection of bottom samples off Pedro Bank, which lies southwest of Jamaica was also accomplished. The track-line of the cruise is shown. Brief descriptions of the various programs carried on during the cruise are given. Data are restricted to station locations, bathymetry and surface temperatures. (Author)

AD-284 896 Div. 2
(TISTP/JW) OTS price $8.60

Arctic Inst. of North America, Washington, D. C.
METEOROLOGICAL AND GLACIOLOGICAL STUDIES ICE RISE STATION, WARD HUNT ISLAND, MAY TO SEPTEMBER 1960,
by R. B. Sagar. July 62, 87p. incl. illus. tables, 35 refs. (Research paper no. 24; Scientific rept. no. 5)
(Contract AF 19(604)8343, Proj. 7628; Continuation of Contract AF 19(604)7628)
(AFCRL 62-848) Unclassified report

DESCRIPTORS: *Meteorology, *Glaciers, Temperature, Wind, Sun, Climatic factors, Pressure, Humidity, Ablation, Arctic regions.

Surface climate on the Ward Hunt Ice Rise from May to early September 1960 is given. The relative importance of the ablation season heat-balance components is assessed from accumulation and ablation data, subsurface temperature changes and microclimatological observations. The principal energy source is the net flux of radiation. The net energy gain due to turbulent transfer is

considered to be small or even negative over the whole ablation season. Various observations are compared with those of the 1959 season. Relatively small changes in the amount of accumulation and in the radiative energy flux, or in both, can have a marked effect on the mass balance of the Ward Hunt Ice Rise and Ice Shelf. (Author)

AD-284 910 Div. 2
(TISTP/GRW) OTS price $16.00

National Engineering Science Co., Pasadena, Calif.
THE NATURE OF TSUNAMIS. THEIR GENERATION AND DISPERSION IN WATER OF FINITE DEPTH,
by Basil W. Wilson, Lois M. Webb and James A. Hendrickson. Aug 62, 1v. incl. illus. tables, refs. (Technical rept. no. SN 57-2)
(Contract CGS-801(2442))
Unclassified report

Original contains color plates: All ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Seismic waves, *Ocean bottom, Earthquakes, Classification, Hazards, Intensity, Geological survey, Northern hemisphere, Southern hemisphere.

Current knowledge on important characteristics of tsunamis and their modes of generation is assembled. A review of seismic source mechanisms discloses that evidence is in favor of molar upthrusting or down-drop of the sea-bed, over an extensive fault-line or bottom area, being the principal mode by which dangerous tsunamis are generated. Submarine landsliding and volcanic eruption in open water are likely to be less effective mechanisms, though underwater slumping in confined areas such as bays or channels and above-water collapse of coastal cliffs are capable of producing devastating results along localized coastal boundaries. Noteworthy tsunamis are unlikely to result from earthquakes of magnitude less than M = 6.4 (Richter scale). Dangerous tsunamis may be expected when M exceeds about 7.75. Laws of wave height decay and period increase with distance are established on theoretical and experimental grounds. (Author)

AD-284 936 Div. 2
(TISTP/GRW) OTS price $8.60

Air Weather Service, Scott Air Force Base, Ill.
TERMINAL FORECAST MANUAL, DETACHMENT 7, 24TH WEATHER SQUADRON, MATHER AIR FORCE BASE, CALIFORNIA.
10 July 61, 1v. incl. illus. tables.
Unclassified report

Original contains color plates: All ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Weather forecasting, *Handbooks, Meteorological data, California, Meteorological charts, Airports.

AD-284 937 Div. 2
(TISTP/GRW) OTS price $1.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
STABILITY OF ICE-AGE ICE CAPS,
by Johannes Weertman. June 62, 12p. incl. illus. 10 refs. (Research rept. no. 97)
(DA Proj. 8S-66-02-661)
Unclassified report

DESCRIPTORS: *Glaciers, Mechanical properties, Arctic regions, Ablation, Stability, Mathematical analysis, Growth.

The stability of large ice caps is investigated using the present-day theory of the flow of ice in glaciers and ice sheets. The type of instability is that mentioned by Bodvarsson. It is concluded that a small arctic ice cap can become unstable and expand into a large ice-age ice sheet as a result of moderate changes in the regime of the ice cap. A large continental ice cap also can become unstable and shrink to nothing if the snow accumulation is reduced or the ablation rate increased. The results fit well into the Ewing-Donn theory of ice ages. There is the possibility that the inherent instability of ice-age ice caps is in itself sufficient to explain both the formation and disappearance of these ice caps. (Author)

AD-284 938 Div. 2
(TISTP/GRW) OTS price $1.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
THE SALINITY DISTRIBUTION IN YOUNG SEA ICE,
by W. F. Weeks and O. S. Lee. Feb 62, 13p. incl. illus. tables, 21 refs. (Research rept. no. 98)
(DA Proj. 8-66-02-400)
Unclassified report

DESCRIPTORS: *Ice, *Salinity, Greenland, Statistical analysis, Sampling.

Studies were conducted at North Star Bay (NW Greenland) during Oct-Nov 1956 to examine the lateral and vertical salinity variation in known types of natural sea ice. Sampling procedures and data analysis are described in detail. The data show that the standard deviation of the salinity values from closely spaced cored samples in sheet ice are always equal to or greater than ±0.3‰. In pancake ice, the standard deviation is usually ±1.0‰. This uncertainty will produce a standard deviation of approximately ± 4 to 6% of the total brine volume in the sheet ice and ± 11 to 19% in pancake ice. This accounts for a considerable portion of the scatter observed in studying the strength properties of sea ice. (Author)

AD-284 939 Div. 2
(TISTP/GRW) OTS price $1.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
STUDIES OF THE AGE HARDENING OF PROCESSED SNOW,
by T. R. Butkovich. June 62, 12p. incl. illus. tables, 13 refs. (Research rept. no. 99)
(DA Proj. 8-66-02-400)
Unclassified report

DESCRIPTORS: *Snow, Mechanical properties, Greenland, Density, Sublimation, Hardening.

A study of how age hardening affects the various mechanical properties of processed snow was made. A description of how the age hardening process is affected by the variables of density, temperature, grain size, and shape is given. An empirical equation relating creep rate to stress, age, and density was obtained. The study also shows that the various mechanical properties are related to age by an exponential function. (Author)

AD-284 951 Div. 2
(TISTP/JW) OTS price $6.60

Canterbury U. (New Zealand).
THE ANNUAL AND DIURNAL VARIATION OF METEOR RATES

IN THE SOUTHERN HEMISPHERE.
Final rept. Feb 60-Jan 61,
by C. D. Ellyett and C. S. L. Keay. 4 May 62
29p. illus. tables, 24 refs.
(Contract AF 64(500)6, Proj. 5631)
(AFCRL 62-324)
Unclassified report

DESCRIPTORS: *Meteors, Frequency, Echo ranging, Diurnal variations, Noise, Measurement, Radar equipment, Southern hemisphere.

The results are given of a continuous survey of meteor rates for the year from February, 1960 to January, 1961. The omni-directional radar equipment used operated at a frequency of 69.5 megacycles, and was located near Christchurch, New Zealand. Extensive measures were adopted to ensure constancy of the equipment parameters and the elimination of sensitivity variations due to external noise, both man-made and natural. Meteors were recorded down to a limiting radio magnitude of +9.1, while the most frequently observed meteors were of radio magnitude +6.2. Echo rates as high as 200 per hour were often obtained. It is shown that reliable meteor rates can be obtained free from the influence of ionospheric effects. The dominating influence of the angle between the observing station and the apex of the earth's way is definitely established. (Author)

AD-284 966 Div. 2
(TISTP/JW) OTS price $7.60

Coastal Studies Inc., Louisiana State U.,
Baton Rouge.
COASTAL PIONEER PLANTS AND HABITAT IN THE TAMPICO REGION, MEXICO,
by John J. Poggie, Jr. 1 June 62, 62p. incl. illus. tables, refs. (Technical rept. no. 17, pt. a; Contribution no. 62-1)
(Contract Nonr-157503, Proj. NR 388 002)
Unclassified report

DESCRIPTORS: *Plants, *Climatic factors, Soils, Wind, Moisture, Data, Analysis, Mexico.

Coastal pioneer plants of the sandy coast of Cabo Rojo, Veracruz, Mexico were studied in relation to their habitat. Field techniques consisted of plant collection, transect surveys and soil sample gathering. Laboratory work included plant identification, soil analyses and habitat data interpretation. Evidence from the two sections of Cabo Rojo indicates that areas exposed to strong winter winds are more suited to the growth of shrubs, and experience greater seasonal shifts in vegetation, than areas protected from these winds. Soil analyses indicate that the entire area is an edaphic desert, with no striking differences between the two sections of the cape. (Author)

AD-284 967 Div. 2
(TISTP/GRW) OTS price $14.00

Coastal Studies Inst., Louisiana State U.,
Baton Rouge.
THREE CARIBBEAN ATOLLS: TURNEFFE ISLANDS, LIGHTHOUSE REEF, AND GLOVER'S REEF, BRITISH HONDURAS.
Technical rept. no. 11, pt. G on Caribbean Beach Studies,
by D. R. Stoddart. 30 Aug 62, 203p. incl. illus. tables, refs. (Contribution no. 62-3; Atoll research bulletin no. 87)
(Contract Nonr-157503, Proj. NR 388 002)
Unclassified report

DESCRIPTORS: *Caribbean islands, *Coral reefs, Geophysics, Oceanographical charts, Geological survey.

AD-284 968 Div. 2
(TISTP/JW) OTS price $1.60

Kaysam Corp. of America, Paterson, N. J.
PRODUCTION ENGINEERING MEASURE FOR MANUFACTURE OF METEOROLOGICAL BALLOONS TYPE ML-541( )/UM.
Quarterly progress rept. no. 1, 19 Apr-18 July 62,
by Murray Miner, ed. by John Kantor. 18 July 62, 11p.
(Contract DA 36-039-sc-85988)
Unclassified report

DESCRIPTORS: *Meteorological balloons, Production, Test methods, Manufacturing methods.

A study was made of hand techniques for assembly of head to tail balloons. The object of this study was to confirm all data relating to assembly and to improve the techniques where possible. Investigations were made of various techniques, including the use of a vacuum-holding ring and a cone-edged ring in assembly. A procedure for the design of the dipping form for head balloons was completed. Head balloons which were made from a Kaysam-modified form were employed in experiments for joining the head to the tail balloon. (Author)

AD-284 969 Div. 2
(TISTP/JW) OTS price $3.60

Midwest Research Inst., Kansas City, Mo.
RESEARCH STUDIES RELATED TO MAPPING, GEODESY AND POSITION DETERMINATION.
Interim technical rept. no. 14, 19 Mar-18 June 62,
by S. Brown. 18 June 62, 33p. incl. illus.
(Contract DA 44-009-eng-3769, Proj. 8T35-12-001-01)
Unclassified report

DESCRIPTORS: *Mapping, *Geodesics, *Differential equations, Wave characteristics, Electromagnetic waves, Refractive index, Measurement.

A system for making remote measurements of the index of refraction profile is investigated. It is demonstrated that the index of refraction profile can be determined if a knowledge of the reflection coefficient is assumed.

AD-284 998 Div. 2, 15
(TISTP/WH) OTS price $1.60

Agricultural Research Service, Cornell U.,
Ithaca, N. Y.
MATHEMATICAL STUDY OF THE FIRST STAGE OF DRYING OF A MOIST SOIL.
Report on The Energy Budget at the Earth's Surface,
by Winton Covey. June 62, 10p. table (Interim rept. no. 62-1)
(In cooperation with New York State Coll. of Agriculture, Cornell U., Ithaca)
Unclassified report

DESCRIPTORS: *Soils, *Moisture, *Evaporation, *Diffusion, Nonlinear differential equations.

A nonlinear differential equation is used to characterize non-steady, one-dimensional, unsaturated flow of water in isothermal, homogeneous soil material. Procedures are shown for solving the equation for a semi-infinite medium with a constant rate of evaporation at the finite boundary. The physical model assumes that gravity effects are negligible, and that the soil water diffusivity for a given medium is a unique exponential function of the water content. A number of numerical solutions of the problem are tabulated for various water loss rates. The solutions are based on the assumption of constant initial moisture content within the medium. (Author)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-284 999 Div. 2, 25
(TISTP/WH) OTS price $1.60

Agricultural Research Service, Cornell U., Ithaca, N. Y.
THEORETICAL ESTIMATE OF PHOTOSYNTHESIS UNDER FIELD CONDITIONS.
Report on The Energy Budget at the Earth's Surface,
by Conrad S. Yocum. July 62, 14p. incl. table, 13 refs. (Interim rept. no. 62-2)
(In cooperation with New York State Coll. of Agriculture, Cornell U., Ithaca)
Unclassified report

DESCRIPTORS: *Plants, *Photosynthesis, *Carbon dioxide, *Corn.

Using reasonable estimates of light absorption by a crop of plants growing under natural conditions, the maximum thermal efficiency for photosynthesis is calculated to be 14% of incident radiation in the 0.4 to 0.7 micron wave lengths. Aerodynamic exchange calculations of carbon dioxide in an active corn crop gave an estimated photosynthetic efficiency of 4% of the toal incident shortwave radiation 0.3 - 3.0 micron, or 29% or the photosynthetic potential. An attempt was made also to evaluate some components of the carbon dioxide transfer processes involved. (Author)

AD-285 018 Div. 2
(TISTP/JW) OTS price $1.60

Air Force Cambridge Research Lab., Bedford, Mass.
MEASUREMENT RANGE REQUIRED OF METEOROLOGICAL EQUIPMENT,
by Arnold Court and Henry Salmela. Aug 62, 11p. incl. table, 21 refs. (Instrumentation for Geophysics and Astrophysics no. 22; AFCRL 62-825)
(MDL Proj. 8624)
Unclassified report

DESCRIPTORS: *Meteorological instruments, *Atmospheric sounding, Instrumentation, Reliability, Temperature, Measurement, Atmospherics.

Meteorological instruments must operate properly to accurately measure conditions too extreme for the design and operation of other equipment. This report develops the 'improbable extreme' conditions which surface instruments must be designed to measure: temperatures from -140 F to +160 F, dewpoint at any temperature, T in deg F, given by T/2-80, rainfall during t minutes square root of t divided by 2 inches, wind speeds up to 250 mph, and pressure from 506 to 1062 mb. Atmospheric sounding systems must be able to measure temperatures and corresponding dewpoints over the same range, winds up to 300 mph below 100,000 ft, and pressures whose ratio to the Standard Atmosphere pressure, p, at the maximum height they are expected to attain, is 0.1 (6 + log p) up to 133 km, and 0.1 at still higher levels. (Author)

AD-285 019 Div. 2
(TISTP/JW) OTS price $4.60

Air Force Cambridge Research Lab., Bedford, Mass.
PROPOSED REVISION OF U. S. STANDARD ATMOSPHERE 90 TO 700 KM,
by Kenneth S. W. Champion and Raymond A. Minzner. July 62, 37p. incl. illus. tables, 35 refs.
(Rept. no. AFCRL 62-802)
(Proj. 6690)
Unclassified report

DESCRIPTORS: *Atmosphere, *Molecular weight, *Equations, Altitude chambers, Pressure, Temperature, Hydrostatic pressure, Atmospherics, Boundary layer, Model tests.

The equations and the two principal techniques used to produce self-consistent model atmospheres are reviewed. One technique consists of defining the model in terms of the atmospheric properties at ground level (or some other base level) and the molecular-scale temperature at higher altitudes in the form of linear segments. The second consists of specifying a density curve and calculating a molecular-scale temperature curve in terms of the molecular-scale temperature at some reference level and the density values. The specific equations and boundary conditions used to develop the present model are given. This is followed by the defining properties of the proposed standard and a short table of the principal atmospheric properties between 90 and 700 km. The mean molecular weight used in the standard is described, including a brief discussion of the method of calculation of the density of each of the nine major constituents used to calculate the mean weight. (Author)

AD-285 112 Div. 2, 20
(TISTP/JW) OTS price $3.60

Aerospace Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE. REVIEW OF SOVIET LITERATURE.
Monthly rept. no. 27 for July 62.
31 Aug 62, 34p. incl. illus. 23 refs.
(AID rept. no. 62-119)
Unclassified report

DESCRIPTORS: *Van Allen radiation belt, *Sun, *Atmospheric electricity, Ionosphere, Cosmic rays, Magnetic fields, Solar flares, Aurorae, Bibliography.

AD-285 114 Div. 2, 20
(TISTP/JW) OTS price $2.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
NUCLEAR/WEATHER CLOUD INDICATOR,
by William G. Stone. Apr 62, 29p. incl. illus. 1 ref. (ASRDL Technical rept. no. 2272)
(DA Proj. 3M36-04-001-02)
Unclassified report

DESCRIPTORS: *Detection, *Clouds, Electronic equipment, Radar analysis, Data processing systems, Meteorological data, Model tests, Design, Weather forecasting, Nuclear forces, Detectors.

A detailed discussion is presented of the design, development, construction, and performance of an experimental model of a nuclear/weather cloud detector unit to be used with a radar set such as the AN/CPS-9, and to be utilized as an electronic device for the detection and analysis of nuclear clouds or of slow and small changes in weather patterns. The equipment receives radar weather data from the radar PPI display, stores, and compares it with real-time radar information. The difference between real-time and stored data as displayed by the indicator unit represents movement of information, whether it be weather cloud or the instantaneous occurrence of a nuclear cloud. (Author)

AD-285 115 Div. 2
(TISTP/GRW) OTS price $2.60

Aeronautical Icing Research Labs., Arcata, Calif.
FOG STUDIES AT ARCATA, CALIFORNIA UNDER ''OPERATION PEA SOUP'' 1960-1962.
Final rept., 15 Feb 60-31 Aug 62,
by G. P. Ettenheim, Jr., J. B. Howe, and H. L. Webster. Sep 62, 17p. incl. illus. tables, 8 refs. (Technical note no. 572)
(Contract AF 19(604)7210, Proj. 7605)
(AFCRL 62-897) Unclassified report

DESCRIPTORS: *Fog, Reduction, Target recognition, Visibility, Water vapor, Measurment, California.

AD-285 117 Div. 2
(TISTP/FR) OTS price $3.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
DIRECT AND INDIRECT VISIBLE RADIATION YIELD FROM A POINT SOURCE UNDER DIFFERENT WEATHER CONDITIONS,
by Israel Cantor. Apr 62, 35p. incl. illus. table, 8 refs. (ASRDL technical rept. no. 2270)
(DA Proj. 3A99-27-005-13)
Unclassified report

DESCRIPTORS: *Light transmission, *Scattering, Light, Aerosols, Clouds, Snow, Atmosphere, Measurement.

Measurements of ratios of scattered to direct thermal radiation in the visible region were made between two and three miles west of the ocean shoreline. Source-to-receiver distances of approximately one and two miles were involved, with general weather conditions varying from close to two miles visibility, snow-covered ground, and overcast skies, to clear skies, no snow, and visibility greater than 20 miles. Results indicate situations where the indirect or scattered radiation is appreciably greater than the direct radiation. Tentative empirical relationships are derived for a 180-degree receiver field of view in a hazy atmosphere for some of the cases where no snow and cloudless skies exist, and compared with those of several previous investigators in the field. Results are also presented for cases involving snow-covered ground and/or clouds. An empirical relationship is tentatively developed for the situation involving only the presence of snow. In addition, some consideration is given to the multiple-scattering problem. (Author)

AD-285 177 Div. 2, 20
(TISTP/JW) OTS price $1.60

Illinois State Water Survey, Urbana.
INVESTIGATION OF THE QUANTITATIVE DETERMINATION OF POINT AND AREAL PRECIPITATION BY RADAR ECHO MEASUREMENTS.
Quarterly technical rept. no. 3, 1 Apr-30 June 62,
by E. A. Mueller and G. E. Stout. 30 June 62, 17p. incl. illus. tables.
(Contract DA 36-039-sc-87280)
Unclassified report

DESCRIPTORS: *Precipitation, *Radar echo areas, Raindrops, Trafficability, Radiation effects, Weather forecasting, Analysis of variance, Data processing systems, Measurement.

During the data collection period 12 rolls of drop camera data from Franklin, North Carolina, were measured, and the preliminary data processing was accomplished. At the same time, 13 rolls from Island Beach, New Jersey, were processed. A brief resume of the continuing work including coalescence type distributions to the average drop size distributions, obtained previously from Miami, Florida, is given. In general, it was found that the drop size distributions in rainshowers from Miami were of the same shape as the theoretical coalescence distributions although the coalescence parameters did not show the continuity desired. (Author)

AD-285 199 Div. 2
(TISTP/MS) OTS price $1.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
THE POSITION ANGLE METHOD FOR DETERMINATION OF LUNAR PHYSICAL LIBRATION PARAMETERS,
by A. A. Yakovkin. 1962, 9p. incl. illus. 5 refs. (Trans. no. T-1624 from Akademika Nauk USSR, Kiev (Holovna Astronomichan Observatoriia) 4:1,pp.3-11, 1961)
Unclassified report

DESCRIPTORS: *Moon, *Geodetic astronomy, Geometry, Test methods, Extraterrestrial geography.

AD-285 206 Div. 2
(TISTP/MS) OTS price $1.10

Danish Meteorological Institute, Charlottenlund.
INVESTIGATION ON THE DURATION OF SUNSHINE IN GREENLAND BY OPERATING 11(ELEVEN) SUNSHINE STATIONS, UTILIZING CAMPBELL-STOKES RECORDERS. FURTHER: MEASUREMENTS OF SUNSHINE INTENSITY AT (PROVISIONALLY) ONE SINGLE STATION IN GREENLAND.
Final technical rept., 1 Oct 59-30 Sep 60,
by Karl Anderson. 31 Oct 60, 3p.
(Contract DA 91-591-EUC-1216)
Unclassified report

DESCRIPTORS: *Sun, *Solar energy, *Greenland, Recording devices, Weather stations, Intensity, Measurement, Time.

AD-285 207 Div. 2
(TISTP/MS) OTS price $1.60

4th Weather Group, Eglin Air Force Base, Fla.
DERIVATION OF UPPER AIR WIND PROFILES.
2 Oct 62, 12p. incl. illus. tables, 2 refs.
(4th WG Pamphlet no. 105-13-2)
Unclassified report

DESCRIPTORS: *Wind, *Stratosphere, Statistical processes, Statistical analysis.

AD-285 243 Div. 2
(TISTP/MS) OTS price $1.10

American Meteorological Society, Boston, Mass.
THE SEARCHLIGHT BEAM IN THE ATMOSPHERE (Prozhektornyi Luch v Atmosfere),
by G. V. Rozenberg, tr. by Robert Sholiton.
June 62, 2p. (Trans. no. M-RTC-39 from Izdatel'stvo Akademii Nauk SSSR, 243pp. 1960)
(Contract AF 19(604)6113)
Unclassified report

DESCRIPTORS: *Atmosphere, *Weather forcasting, *Searchlights, Measurement, Test methods, Brightness, Intensity, Light, Scattering, Visibility, Optics, Illumination.

Contents:
Problems of forecasting visibility and searchlight sounding of the atmosphere
Optical properties of the atmosphere
The structure of a searchlight beam
An approximate theory of visibility and a theory of searchlight sounding of the atmosphere

Quantitative analysis of the influence of various factors on the intensity of scattered light of a searchlight
Experimental verification of the theory and some results of searchlight sounding of the atmosphere

AD-285 257 Div. 2
(TISTP/MS) OTS price $3.60

Interagency Committee on Oceanography, Washington, D. C.
OCEANOGRAPHIC SHIP OPERATING SCHEDULES - FISCAL YEAR 1963.
Mar 62, 31p. illus. (ICO Pamphlet no. 4)
Unclassified report

DESCRIPTORS: *Oceanographic vessels, Scheduling.

AD-285 265 Div. 2
(TISTP/FR) OTS price $10.50

Massachusetts Inst. of Tech., Cambridge.
NUCLEAR GEOPLOSICS. A SOURCEBOOK OF UNDERGROUND PHENOMENA AND EFFECTS OF NUCLEAR EXPLOSIONS. PART TWO. MECHANICAL PROPERTIES OF EARTH MATERIALS,
by R. B. Whitman. 15 June 62, 124p. incl. illus. tables, 136 refs.
(Contracts DA 22-079-eng-224 and DA 49-146-xz-030)
(DASA-1285, pt. 2) Unclassified report

DESCRIPTORS: *Soils, *Rock, Sand, Clays, Mechanical properties, Shear stresses.

Contents:
Background and basic concepts
Tests to determine mechanical properties
Behavior of earth materials under small shear stresses
Behavior of earth materials during shear failure
Practical determination of mechanical properties for ground motion predictions

AD-285 314 Div. 2
(TISTP/GRW) OTS price $10.50

Geophysical and Polar Research Center, U. of Wisconsin, Madison.
GEOPHYSICAL INVESTIGATIONS OF THE ARCTIC OCEAN BASIN,
by Ned A. Ostenso. June 62, 124p. incl. illus. tables, 115 refs. (Research rept. no. 62-4)
(Contract Nonr-120216)
Unclassified report

DESCRIPTORS: *Arctic regions, *Ocean bottom, Geological survey, Gravity, Terrestrial magnetism, Bathythermograph data, Oceanographical charts.

AD-285 335 Div. 2
(TISTP/TL) OTS price $1.10

Aerospace Information Div., Washington, D. C.
METEOR TRAIL OBSERVATIONS,
1 Oct 62, 7p. (AID rept. no. 62-151)
Unclassified report

DESCRIPTORS: *Meteors, Wake, Bibliography, Condensation.

AD-285 339 Div. 2
(TISTP/MS) OTS price $1.10

Aerospace Information Div., Washington, D. C.
CRUSHING ENERGY AND THE STRENGTH OF ROCKS.
18 Sep 62, 2p. (AID rept. no. 62-136; Trans. from Makarov, I. V. Energy Consumption in Rock Crushing and Strength of Rocks. IN: Akademiya Nauk SSSR. Sibirskoye Otdeleniye. Izvestiya no. 4; 3-8, 1962)
Unclassified report

DESCRIPTORS: *Rock, Mathematical analysis, Energy, Mechanical properties.

AD-285 340 Div. 2
(TISTP/MS) OTS price $1.10

Aerospace Information Div., Washington, D. C.
LUNAR MICRORELIEF.
19 Sep 62, 2p. (AID rept. no. 62-141, Suppl. to AID rept. no. 62-4; Trans. from Sytinskaya, N. N. Probable Dimensions of Irregularities in the Microrelief of the Lunar Surface. IN: Akademiya Nauk SSSR. Komissiya po Fizike Planet. Izvestiya, no. 1; 81-84, 1959)
Unclassified report

DESCRIPTORS: *Extraterrestrial geogrphy, *Moon, Measurement, Brightness, Surface properties.

AD-285 341 Div. 2, 25
(TISTP/MS) OTS price $1.10

Aerospace Information Div., Washington, D. C.
LUNAR LIGHT POLARIZATION.
19 Sep 62, 3p. (AID rept. no. 62-142, Suppl. to AID rept. no. 62-4, AD-275 255; Trans. from Kokhan, Ye. K. Investigations, Conducted in Three Regions of the Spectrum, of the Degree of Polarization and of the Angle of the Plane of Polarization of Light Reflected From Lunar Details. IN: Akademiya Nauk SSSR. Komissiya po Fizike Planet. Izvestiya, no. 1:pp. 41-53, 1959)
Unclassified report

DESCRIPTORS: *Extraterrestrial geography, *Moon, *Polarization, Spectrographic analysis.

AD-285 342 Div. 2
(TISTP/MS) OTS price $1.10

Aerospace Information Div., Washington, D. C.
MARTIAN CONTINENTS AND SEAS.
19 Sep 62, 2p. (AID rept. no. 62-143, Suppl. to AID rept. no. 61-138, AD-266 481; Trans. from Koval' I. K. On the Degree of Smoothness of the Continents and Seas of Mars. IN: Akademiya Nauk SSSR. Komissiya po Fizike Planet. Izvestiya, no. 1:pp. 85-92, 1959)
Unclassified report

DESCRIPTORS: *Mars, Photographic analysis, Brightness, Distribution, Optical images, Measurement, Mathematical analysis, Extraterrestrial geography.

AD-285 343 Div. 2, 25, 24
(TISTP/MS) OTS price $1.10

Aerospace Information Div., Washington, D. C.
LUNAR TEMPERATURE MEASUREMENTS.
19 Sep 62, 3p. (AID rept. no. 62-144, Suppl. to AID rept. no. 62-4, AD-275 255; Trans. from Chistyakov, Yu. N. Attempt at Determining the Temperature of Separate Sectors of the Lunar Surface. IN: Akademiya Nauk SSSR. Komissiya Po Fizike Planet. Izvestiya, no. 2: pp. 46-54, 1960)
Unclassified report

DESCRIPTORS: *Moon, Measurement, Temperature sensitive elements, USSR, Surface temperature.

AD-285 344 Div. 2, 25, 24
(TISTP/MS) OTS price $1.10

Aerospace Information Div., Washington, D. C.
DIMENSIONS OF MARS.
19 Sep 62, 2p. (AID rept. no. 62-145, Suppl. to AID rept. no. 61-138; Trans. from Lebedeva, I. I. Measurement of the Diameter and Oblateness of Mars on the Basis of Photos Obtained in 1956. IN: Akademiya Nauk SSSR. Komissiya po Fizike Planet. Izvestiya, no. 2:pp. 41-45, 1960)
Unclassified report

DESCRIPTORS: *Mars, Photographic intelligence, Photometers, Measurement, USSR, Photographic analysis.

AD-285 346 Div. 2, 25, 24
(TISTP/MS) OTS price $1.10

Aerospace Information Div., Washington, D. C.
PHOTOMETRY OF MARS.
21 Sep 62, 1p. incl. tables (AID rept. no. 62-148, Suppl. to AID rept. no. 61-138, AD-266 481; Trans. from Barabashov, N. P., I. K. Koval' and A. T. Chekirda. Photometric Observations of Mars in 1958. IN: Akademiya Nauk SSSR. Komissiya po Fizike Planet. Izyestiya, no. 3, pp. 3-15, 1961)
Unclassified report

DESCRIPTORS: *Mars, Photographic intelligence, Photometers, Photographic film, Photographic emulsions, Measurement, USSR, Brightness, Photographic filters, Photographic analysis.

AD-285 347 Div. 2, 25, 24
(TISTP/MS) OTS price $1.10

Aerospace Information Div., Washington, D. C.
LUNAR CRATERS.
21 Sep 62, 2p. (AIR rept. no. 62-150, Suppl. to AID rept. no. 62-4, AD-275 255; Trans. from Polozhentseva, T. A. On the State of Alphonsus Crater Before the Onset of the Eruption of 3 Nov 1958. IN: Adademiya Nauk SSSR. Komissiya po Fizike Planet. Izvestiya, no. 3, pp. 46-49, 1961 2. Barabashov, N. P., and V. I. Yezerskiy. Spectrophotometric Observations of Lunar Craters. Ibid, pp. 50-55)
Unclassified report

DESCRIPTORS: *Moon, *Spectographic analysis, *Extraterrestrial geography, Volcanoes, Volcanic dust, Gases, USSR, Measurement.

AD-285 359 Div. 2
(TISTP/MS) OTS price $5.60

Interagency Committee on Oceanography, Washington, D. C.
OCEANOGRAPHIC RESEARCH IN THE FEDERAL GOVERNMENT - FISCAL YEAR 1963.
31 May 62, 51p. incl. table (ICO Pamphlet no. 5; Suppl. to ICO Pamphlet no. 3, AD-285 360)
Unclassified report

DESCRIPTORS: *Oceanography, *Research program administration, Federal Government, Federal budgets, Oceans, Scientific research.

A program is discussed with the following objectives: (1) to describe the distribution of physical and chemical properties of the oceans and to understand the dynamic processes which affect this distribution; (2) to determine the interrelationships of the oceans and atmosphere; (3) to determine the distribution, kind and adaptation of the living population of the sea and to understand the interrelationship of the marine organisms to the physical and chemical properties of the sea; (4) to describe the sea floor and to understand its long-term and short-term evolution; including the topography, geophysical nature and subsurface structure, with particular interest in the sea floor's relation to the surrounding land masses; (5) to determine how the oceans can be exploited to benefit mankind; and (6) to determine the effect of radioactivity and pollution on the physical, chemical, geological and biological properties of the oceans. (Author)

AD-285 360 Div. 2
(TISTP/GRW) OTS price $3.60

Interagency Committee on Oceanography, Washington, D. C.
NATIONAL OCEANOGRAPHIC PROGRAM - FISCAL YEAR 1963.
Apr 62, 31p. incl. illus. tables (ICO Pamphlet no. 3)
Unclassified report

DESCRIPTORS: *Oceanography, *Research program administration, Indian Ocean, Federal budgets.

AD-285 378 Div. 2
(TISTP/MS) OTS price $4.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
PLANETARY ATMOSPHERES AND RELATED INFORMATION. Supplementary bibliography,
by E. Colabrese. Aug 62, 42p. (Rept. no. R62SD85; Suppl. to R61SD126, AD-266 458)
Unclassified report

DESCRIPTORS: *Planetary atmospheres, *Bibliography, Planets, Instrumentation, Space probes, Optics, Ionosphere.

References to planetary studies, located between October 1961 and August 1962, are contained in this supplement. As in the original bibliography, emphasis is on the atmospheres of the planets. References to other properties of the planets and to methods of investigation and exploration are also included. There are 110 items, most of them annotated, arranged alphabetically by author. (Author)

AD-285 419 Div. 2
(TISTP/MS) OTS price $6.60

Washington U., Seattle.
THE RADIATION REGIME OF DRIFTING STATION CHARLIE FOR AUGUST-OCTOBER 1959,
by A. Hanson and B. Lieske. Sep 62, 10p. tables. (Contract Nonr-47724, Proj. NR 307 252)
Unclassified report

DESCRIPTORS: *Weather stations, *Solar energy, Data.

Radiation observations that were reduced for Drifting Station Charlie for the months of August through October 1959 are included. These data show the effect of fog, low clouds and clear sky on the radiation balance. (Author)

AD-285 446 Div. 2
(TISTP/GRW) OTS price $1.10

Space Sciences Lab., U. of Calif., Berkeley.
ANALYSIS OF EARTH CURRENT FLUCTUATIONS NEAR LAFAYETTE, CALIFORNIA,
by Douglas P. O'Brien and S. H. Ward. 17 Aug 62, 3p. illus. (Series no. 3, Issue no. 15) (Contract Nonr-22289)
Unclassified report

DESCRIPTORS: *Terrestrial magnetism, California, Electric fields, Measurement, Periodic variations, Diurnal variations, Wave analysis.

Earth current records from Briones Valley, near Lafayette, California for the period December 1, 1961 to December 31, 1961 were studied on a semi-quantitative basis. The study involved measurement of period and duration of significant fluctuations, and a qualitative evaluation of their amplitudes and wave forms. A general pattern of earth current activity for a typical month was obtained. The spectrum of the records ranged from periods of 3 sec to 2 hr or more. As difficulty was encountered in determining the inception time of long period waves, only periods up to 10 min were studied. Background noise, from powerlines, in the 6 to 24 sec period range often obscured the readings of high frequency events. (Author)

AD-285 464 Div. 2
(TISTP/GRW) OTS price $7.60

National Engineering Science Co., Pasadena, Calif.
STUDY OF NATURAL FORCES ACTING ON FLOATING ICE FIELDS.
Final rept.,
by James A. Hendrickson, Lois M. Webb, and Robert J. Quigley. Sep 62, 72p. incl. illus. tables, refs.
(Contract NBy-32215)
Unclassified report

DESCRIPTORS: *Ice, Motion, Deformation, Stresses, Arctic regions, Thickness, Potential theory, Partial differential equations, Water waves.

The response of finite ice floes to water waves is analyzed for relatively deep water. The deformation and peak outer fibre stress are studied for various floe dimensions and elastic properties over a range of incident wave lengths. It is found that for long incident wave lengths the floe duplicates the incident wave characteristics and the response is thus independent of floe thickness. For shorter incident wave lengths the response is strongly dependent upon floe thickness, and the amount of incident wave energy transmitted beneath the floe. For longer incident wave lengths the probability of floe fracture is quite low because the transmitted energy is absorbed in rigid body motion. For shorter incident wave lengths, however, the stresses in the floe can be very high and thus, regardless of floe dimensions, the probability of fracture is high provided that the incident wave amplitude is large. A study of the pertinent properties of sea ice is included in order to establish the values used in the numerical work. (Author)

AD-285 550 Div. 2, 30
(TISTP/TL) OTS price $14.50

Autometric Corp., New York.
UTILIZATION OF DIGITALLY STORED STEREO DATA.
Final rept.
20 Sep 62, 198p. incl. illus. tables (Rept. no. CR 41-FR)
(Contract AF 30(635)19455, Proj. QRC 144 I)
(RADC TR 61-161) Unclassified report

DESCRIPTORS: *Stereoscopic map plotters, *Data storage systems, Digital computers, Programming, Time, Terrain, Feasibility studies, Aerial photography, Reduction.

The results are described of a study program conducted to explore and outline the potential applications of digitally stored stereo data as output by an automatic double projection stereo plotter in terms of both conventional photogrammetric methods and more unconventional means. In addition, an exploration into other sources of digitized data was made and uses evolved for these mediums. The outcome of programming investigation studies is included. These studies were conducted to determine ways in which computers can be used in the solution of stereo problems. The studies concern the properties of computers in general and how these properties affect the computer's usefulness in regard to the requirements of stereo problems. In instances where the nature of computers and stereo problems conflict, recommendations are outlined to reduce these conflicts to the realm of feasibility. (Author)

AD-285 551 Div. 2
(TISTP/AW) OTS price $1.10

4th Weather Wing, Colorado Springs, Colo.
AN OBJECTIVE AID FOR FORECASTING STRONG AND GUSTY SURFACE WINDS AT PORTLAND AFB, OREGON,
by Thomas H. Simmonds. Sep 62, 4p.
Unclassified report

DESCRIPTORS: *Wind, *Weather forecasting, Air force operations, Airports, Gusts.

A technique is described for forecasting strong southwesterly surface winds with gusts greater than 25 knots during the months of December through March at Portland AFB, Oregon. The greater value of this technique lies in its ability to forecast nonoccurrences. Current data and refinements should be added to increase its accuracy and usability. The final product is not so sensitive that it will always cut on and off exactly within the limits specified. On several occasions the method gave near misses which were sufficiently close to be of value to the operational forecast. It was recommended that the main role of this objective aid be that of a guide and that it be modified by the forecaster in those cases where he has information other than that used by the technique. This technique is not reliable for forecasting winds with an easterly component. (Author)

AD-285 555 Div. 2
(TISTP/TL) OTS price $7.60

Eastern Air Lines, Inc., Atlanta, Ga.
RESEARCH DIRECTED TOWARD THE USE OF SYNOPTIC SIMULATION TO DEVELOP FORECAST MODELS COMPATIBLE FOR USE IN SYSTEM 433L.
Final rept.,
by R. J. Shafer, S. J. Donaldson and others.
14 June 62, 71p. incl. illus. tables, 5 refs.
(Contract AF 19(604)7374, Proj. 8641)
(AFCRL 62-876) Unclassified report

DESCRIPTORS: *Weather forecasting, *Visibility, *Simulation, *Air mass analysis, Periodic variations, Wind, Pressure, Temperature, Meteorology, Smokes.

Methods for forecasting visibility at 1200Z from observations at 0600Z and earlier for Idlewild and Washington National Airports are given. The methods include a subjective classification of the 0600Z sea-level chart with respect to the station. The synoptic pressure patterns include Post-trough, Pre-trough, Pre-warm Front, Smoke Patterns, In High, In Low, Hurricanes and Changing Patterns. Solutions for Post-trough and Smoke Patterns involve an automatic forecast. Solutions for the Pre-trough pattern are divided into cases with maritime history and those with continental history. The same basic parameters are used at both stations, an additional predictor being required at Idlewild. The Pre-warm Front system

applies only to Idlewild. Two solutions are given, one using a seasonal stratification, the other a general solution applicable in any season. All predictors are objective and computations simple. The combined solution forecast visibility correctly in 2407 out of 2633 cases. (Author)

AD-285 573 Div. 2
(TISTP/TL) OTS price $1.10

Naval Research Lab., Washington, D. C.
ATMOSPHERIC ELECTRICITY MEASUREMENTS IN THE NORTH ATLANTIC DURING FALLEX-60.
Interim rept.,
by R. V. Anderson and Eva Mae Trent. 7 Sep 62, 5p. incl. illus. 3 refs. (NRL rept. no. 5833)
Unclassified report

DESCRIPTORS: *Atmospheric electricity, *Atlantic Ocean, Fog, Weather forecasting, Measurement.

An atmospheric electricity station was installed aboard the USS NORTHAMPTON in August 1960 and was operated during the fall NATO exercises by NRL personnel. The instrumentation proved to be completely seaworthy. The electric field meter was not sufficiently sensitive in this installation to give usable data, hence this study was restricted to measurements with the atmospheric conductivity meter. The behavior of the conductivity measurements was analyzed for the five occasions when fog was encountered; it was found that in most cases, as is also true on land, there was a significant decrease in the total atmospheric conductivity some 2 to 6 hours before the actual fog incidence. Indication was not given, however, prior to fog dissipation. Although data are not sufficient at present for definitive conclusions, it appears that atmospheric electric conductivity may be a supplemental tool in fog forecasting. (Author)

AD-285 582 Div. 2, 25
(TISTP/TL) OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
AN EXAMINATION OF SOME TIROS II RADIATION DATA AND RELATED STUDIES.
Final rept.,
by P. M. Furukawa, P. A. Davis, and W. Viezee. July 62, 24p. incl. illus. tables, 10 refs. (Contract AF 19(628)322, Proj. 6698)
(AFCRL 62-859) Unclassified report

DESCRIPTORS: *Meteorology, *Satellite vehicles, *Infrared radiation, Measurement, Heat transfer, Atmosphere, Maps, Experimental data.

Sample radiation maps selected from the Tiros II Radiation Data Catalog are examined in order to evaluate their representativeness and limitations. The difficulties encountered in the examination of the data for Channel 1 (6.0 to 6.5 microns) are described. The averaged catalog data for Channel 2 (8 to 12 microns) are compared with the synoptic situation, the actual measurements, and the calculated values of the intensity in the zenith direction. A general discussion of the radiative budget of the troposphere and its relationship to the upward flux at the tropopause is also presented. (Author)

AD-285 594 Div. 2
(TISTP/MS) OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
UTILIZATION OF METEOROLOGICAL SATELLITE CLOUD DATA IN TROPICAL METEOROLOGY,
by James C. Sadler. Aug 62, 40p. incl. illus. 23 refs. (Rept. no. AFCRL 62-829)
(Proj. 6698)
Unclassified report

DESCRIPTORS: *Clouds, *Weather stations, *Weather forecasting, Meteorological data, Tropical regions, Photographic analysis, Satellites.

The TIROS Satellites have made available large volumes of excellent cloud photographs over much of the tropical region. These data, in addition to having great potential in daily analyses for operational purposes, are invaluable to the study and understanding of many tropical atmospheric circulation regimes. Many of these circulation patterns are discussed in relation of the satellite data. A global tropical analysis center is proposed with justifications. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-284 514 Div. 3
(TISTB/SAT) OTS price $1.10

K-9 Training Agency, Hyde, Md.
TRAINING AND USE OF DOGS FOR CW DETECTION.
Final rept., 1 Aug 61-20 July 62,
by L. Wilson Davis. 10 Aug 62, 2p.
(Contract DA 18-108-cml-6607)
Unclassified report

DESCRIPTORS: *Toxic agent alarms, *Chemical warfare agents, *Dogs, G-agents, V-agents, Training, Dosage, Determination, Detection.

Three dogs were trained to detect and avoid GA, GB, GD, VX, CS, BZ. They were found to differ quantitatively in their responses, and to require more training for BZ than for the other agents. (Author)

AD-284 794 Div. 3, 4
(TISTM/REB) OTS price $1.10

Naval Ammunition Depot, Crane, Ind.
INVESTIGATION OF VISIBILITY AND FORMULATION OF ''ASHLESS BLUE FLARE,''
by James McGriffin and William Ripley. 7 Aug 62, 4p. (Rept. no. RDTR 31)
Unclassified report

DESCRIPTORS: *Flares, *Colored flares, Design, Tests, Copper, Particles, Waxes, Visibility, Stearic acids, Ammonium radicals, Perchlorates.

Investigations were conducted for the development of a feasible blue flare formula with the remaining ash residue being as small as possible. A very promising formula was developed containing copper dust as the molecular emitter, ammonium perchlorate, stearic acid, and paraffin. All of the physical and chemical tests performed in estimating the feasibility of using the proposed formula in an operational signal are presented. (Author)

4. CHEMISTRY

AD-284 560 Div. 4
(TISTP/FR) OTS price $3.60

General Mills, Inc., Minneapolis, Minn.
ZEOLITE WATER VAPOR ADSORPTION STUDIES.
Scientific and final rept. 1 Feb-31 Aug 62,
by S. Steinberg and S. Rohrbough. 31 Aug 62,
1v. incl. illus. tables (Rept. no. 2323)
(Contract AF 19(628)338, Proj. 4904)
(AFCRL 62-874) Unclassified report

DESCRIPTORS: *Organolites, Water vapor, Adsorption, Heat, Water.

To implement a study of the water vapor concentration in the stratosphere, the water vapor adsorption characteristics of synthetic zeolites were studied. Tests included zeolite preparation and regeneration, introduction of known quantities of seeded water and recovery of this water, storage contamination, and the possibility of water breakthrough under various conditions. Results showed that the zeolite should be prepared at 1,400 F under vacuum conditions and should be regenerated at 1,600 F under vacuum conditions. Laboratory controls are required to keep possible error in water vapor concentration determinations to within ± 2%. There is practically no water breakthrough, even under adverse conditions. A Dual Molecular Sieve Unit acquired for stratospheric water vapor concentration determinations is described. (Author)

AD-284 574 Div. 4, 25
(TISTM/ODN) OTS price $.50

Naval Research Lab., Washington, D. C.
INVESTIGATION OF FATTY AMINE MONOLAYERS BY CONTACT POTENTIALS,
by K. W. Bewig and W. A. Zisman. 20 Aug 62, 11p. incl. illus. tables, 26 refs. (NRL rept. no. 5815)
Unclassified report

DESCRIPTORS: *Monomolecular films, *Surface properties, *Amines, *Electric potential, Electrodes, Platinum, Gold, Methanes, Iodides, Organic solvents, Phenyl radicals, Hydrocarbons, Adsorption, Surfaces.

A homologous series of pure, primary fatty amines from C4 to C22 was studied in the form of retracted monomolecular films adsorbed on pure polished platinum. The change in the contact potential difference between the platinum electrode and a stable reference electrode of gold coated with FEP Teflon as the result of the adsorption of each condensed monolayer was measured at 20 C and 50% R.H. Measurements were made in air. The molecular packing of amine molecules in each monolayer was measured indirectly by obtaining the contact angle of pure methylene iodide. Contact potential differences were reproduced under these conditions in independent measurements. Monolayers were deposited on the platinum electrode by retraction from pure solvents. Plots of the contact angle vs the number of carbon atoms per amine molecule and of the contact potential difference vs the contact angle were informative about the effects of homology, molecular packing, orientation, and solvent inclusion through molecular adlineation in the monolayers. The molecular adlineation of solvents containing a phenyl group and branching of the hydrocarbon chain were compared with straight chain alkane solvents from which fatty amine monolayers were adsorbed on a platinum electrode. (Author)

AD-284 627 Div. 4
(TISTM/SJR) OTS price $1.60

North Carolina U., Chapel Hill.
THE VISIBLE AND ULTRAVIOLET SPECTRA OF SOME MOLYBDENUM COMPLEXES,
by Sally M. Horner and S. Y. Tyree, Jr.
1 Sep 62, 17p. incl. tables (Technical rept. no. 11)
(Contract Nonr-85505)
Unclassified report

Presented at the Eastern Regional Meeting of the American Chemical Society, Gatlinburg, Tennessee, Nov. 1962.

DESCRIPTORS: *Molybdenum compounds, *Complex compounds, *Ultraviolet spectroscopy, Infrared spectroscopy, Magnetic moments, Spectrographic analysis.

AD-284 647 Div. 4, 10
(TISTM/ODN) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
PROPULSION RESEARCH PROGRAM. SYNTHESIS AND EVALUATION OF POLYFUNCTIONAL FLUOROCARBON AND N-FLUORO COMPOUNDS.
Semiannual technical rept., 1 July-31 Dec 61,
by R. L. Johnson. 9 Feb 62, 8p. (Rept. no. TDR-930(2210-06)TR-1)
(Contract AF 04(647)930)
(DCAS TDR 62-16) Unclassified report

DESCRIPTORS: *Fluorocarbons, *Fluorides, *Binders, Solid rocket propellants, Stability, Metallic compounds, Hydrides, Synthesis, Polymerization, Chlorides, Amides, Lithium compounds, Aluminum compounds, Oxidation, Potassium compounds, Permanganates, Peroxides, Methyl radicals, Hydrogen compounds, Phosphorus compounds, Pentenes, Ethylenes, Alcohols, Acrylic resins, Pentanes, Organic solvents, Resins, Polymers, Chemical reactions.

Fluorine-containing resin binders may impart both thermal stability and, in conjunction with metal hydrides, high impulse to solid propellants. The synthesis of monomers and condensation polymers of high F2 content which would be useful in solid propellant applications is being studied. Three approaches to such polymers are being explored. The first is the telomerization of fluoro-olefins by H2O2 to prepare diol prepolymers for formation of polyurethanes and other condensation polymers. The second is a study of the free-radical coupling of monofunctional fluoro-organic compounds to form difunctional monomers such as diols, diamines, diacids and diisocyanates. The third approach involves reaction of commercial difunctional compounds and their derivatives to form more conventional F2-containing polyesters, polyamides, polyureas, and polyurethanes. (Author)

AD-284 797 Div. 4
(TISTM/REB) OTS price $10.50

Office of Aerospace Research, Washington, D. C.
A DECADE OF CHEMICAL RESEARCH: HISTORY OF THE AIR FORCE OFFICE OF SCIENTIFIC RESEARCH CHEMISTRY PROGRAM,
by Nick A. Komons. May 62, 134p. incl. illus.
(Rept. no. OAR-7)
Unclassified report

DESCRIPTORS: *Air force research, *Chemistry, *Research program administration.

AD-284 895 Div. 4, 30
(TISTM/REB) OTS price $3.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
ELECTROCHEMICAL DEPOSITION OF MAGNETIC NICKEL-IRON FILMS FOR MEMORY APPLICATIONS,
by Stanley Firestone and Joseph Newberg. Mar 62, 34p. incl. illus. tables, 4 refs. (ASRDL technical rept. no. 2275)
Unclassified report

DESCRIPTORS: *Thin films, *Nickel alloys, *Iron alloys, *Magnetic tape, *Memory devices, Preparation, Materials, Physical properties, Chemical properties, Electrodeposition.

An experimental study was made of physical, chemical, and magnetic properties of thin nickel-iron films prepared by electrochemical deposition. A magnetic anneal of nickel-iron films is described. Magnetic film properties necessary for memory applications and their measurement are discussed. Films with a wide range of thicknesses and compositions were prepared to determine optimum electrochemical deposition conditions. Arrays of films were evaluated to determine the effects of various combinations of thickness and bit diameter on coercivity, anisotropy, and loop squareness properties. (Author)

AD-284 908 Div. 4
(TISTM/TCG) OTS price $2.60

Kentucky Research Foundation, Lexington.
CHEMISTRY OF N-SULFINYLAMINES.
Final rept.,
by Walter T. Smith, Jr. 31 Aug 62, 19p. incl. illus. 5 refs.
(Contract AF 49(638)49)
Unclassified report

DESCRIPTORS: *Sulfur compounds, *Organic compounds, *Sulfinyl radicals, *Amines, *Anilines , *Hydrazines, Reaction kinetics, Physical properties, Theory, Oxidation, Hydrolysis, Grignard reagents, Carboxylic acids, Carbonyl radicals, Phosphorus compounds, Chlorides, Benzoyl radicals, Azoles, Synthesis, Chemical reactions.

Three general methods of preparation of N-sulfinylamines were studied. The first involved the direct reaction of the amine with thionyl chloride in an inert solvent. The second method involved the use of a tertiary base such as pyridine in the reaction mixture to take up the HCl and drive the reaction towards completion. The third method makes use of the trans-sulfinylation reaction. This reaction usually involves the reaction of an aromatic N-sulfinylamine with an aliphatic amine to give the aliphatic N-sulfinylamine and aromatic amine. The second method (use of pyridine) is usually the best method and gives good yields from aliphatic and aromatic amines at room temperature. The kinetics of the trans-sulfinylation reaction has been studied extensively. A number of substituted N-sulfinylanilines were prepared by a direct method in yields over 90%. The pyridine method gave a 60% yield in N-sulfinyl-1-heptylamine. The trans-sulfinylation reaction with N-sulfinylaniline and 1 butylamine gave only an 18% yield of N-sulfinyl-1-butylamine. (Author)

AD-284 918 Div. 4, 25
(TISTM/REB) OTS price $6.60

Pennsylvania State U. Coll. of Chemistry and Physics, University Park.
FLUORINE NUCLEAR MAGNETIC RESONANCE SHIELDING IN META SUBSTITUTED FLUOROBENZENES. THE EFFECT OF SOLVENT ON THE INDUCTIVE ORDER,
by Robert W. Taft, Elton Price and others.
Aug 62, 65p. illus. (Technical rept. no. 27)
(Contract Nonr-65605, Proj. NR 055-328)
Unclassified report

Prepared for publication in J. Am. Chem. Soc.

DESCRIPTORS: *Benzenes, *Fluorides, *Nuclear magnetic resonance, Shielding, Solvent action.

The F-19 NMR shielding parameters for 21 meta substituted fluorobenzenes relative to a fixed external standard and relative to fluorobenzene as an internal standard were obtained at room temperature at high dilution in 20 widely varying pure solvents. Extensive measurements with 24 additional substituent groups in non-polar and in hydroxylic solvents, both pure and mixed, were also made. In spite of a variation over 9.2 ppm in shielding for a given fluorobenzene relative to the fixed external standard, the shielding parameters for seven compounds with chemically inert meta substituents relative to internal fluorobenzene are solvent invariant to a precision of the same order as experimental error. This result offers critical evidence that intermolecular shielding resulting from interaction of the F atom with solvent makes little or no contribution to the shielding parameter of a meta substituted fluorobenzene relative to fluorobenzene as the internal standard. A further conclusion is that the field effect makes no practical contribution to the variation in shielding due to meta (and presumably para) substituents. It is further implied that the bond dipole moments of groups are independent to good precision of this variation in dielectric constant for many non-protonic solvents at room temperatures. The effects of solvent on the shielding parameter of meta substituted fluorobenzenes with chemically active substituents is attributed to charge-transfer solvent-substituent interactions. (Author)

AD-285 064 Div. 4
(TISTM/ODN) OTS price $1.60

Frick Chemical Lab., Princeton U., N. J.
THE GLASS TRANSITION TEMPERATURE OF POLYMERIC SULFUR,
by A. V. Tobolsky, W. MacKnight and others.
Sep 62, 7p. illus. tables, 12 refs. (Technical rept. no. RLT-50)
(Contract Nonr-185807, Proj. NR 356-377)
Unclassified report

DESCRIPTORS: *Sulfur, *Polymers, Cooling, Melting, Temperature, Crystals, Heat, Crystallization, Transition temperature.

Pure polymeric sulfur free of dissolved S8 monomer is a semicrystalline polymer with a Tg of 75 C. Quick quenched (from 200 C) elastic sulfur, if maintained under conditions which prevent crystallization, is a solution of polymeric sulfur and S8 rings, both polymer and monomer being in an amorphous state. The Tg of this plasticized polymer is -30 C. (Author)

AD-285 074 Div. 4
(TISTM/REB) OTS price $3.60

Southhampton U. (Gt. Brit.).
RESEARCH ON ELECTRONICALLY EXCITED STATES AND THEIR REACTIONS.
Final technical rept.,
by R. C. Cookson. 26 Apr 62, 28p. incl. illus. tables, 18 refs.
(Contract AF 61(052)191)
(AFCRL 62-860)
Unclassified report

DESCRIPTORS: *Dienes, *Metals, *Carbonyl radicals, *Metal organic compounds, *Electron transitions, Molecular structure, Stereochemistry, Quinones, Methyl radicals, Diels-Alder reaction, Molecular isomerism, Cyclopentenes, Polycyclic compounds, Catalysis, Ketones, Cyclooctatetraene.

The reaction of dienes, especially bicycloheptadiene, with metal carbonyls was explored, resulting in the isolation of a range of ketones and hydrocarbons, the structures and stereochemistry of most of which have been worked out. Both double bonds of the cyclo-octatetraene - maleic acid adduct take part in electrophilic addition, forming tetracyclic products. The unusual rearrangement of the acetylenedicarboxylic ester adduct to derivatives of naphthalene-2:6-dicarboxylic ester was re-investigated. The Woodward-Katz rearrangement of 8-oxo-dicyclopentadiene takes place rapidly and is catalysed by Lewis acids. Such acid catalysis has been extended to the inter-molecular Diels-Alder reaction. UV irradiation of dimethylbenzoquinones gives a series of cis and trans dimers by addition of 2 double bonds to form a cyclobutane ring. The cis dimers undergo a second reaction of the same sort to give saturated, box-shaped molecules. 1-Oxo-dicyclopentadiene gives a cage-photoisomer that is remarkably stable. (Author)

AD-285 083 Div. 4, 10
(TISTM/EJH) OTS price $1.10

Aerospace Corp., Los Angeles, Calif.
PROPULSION RESEARCH PROGRAM. CATALYTIC DECOMPOSITION OF HYDRAZINE.
Semiannual technical rept., 1 Jan-30 June 62,
by P. C. Marx. 31 Aug 62, 5p. incl. table, 5 refs. (Rept. no. TDR-69(2210-13)TR-2)
(Contract AF 04(695)69)
(DCAS TDR 62-162) Unclassified report

DESCRIPTORS: *Hydrazines, *Decomposition, *Catalysts, *Liquid rocket propellants, Cobalt, Silicon compounds, Dioxides, Gels, Thermodynamics, Absorption, Nickel, Catalysis.

A series of catalysts was evaluated for effectiveness in initiating hydrazine decomposition near room temperature by means of differential thermal analysis. The most promising catalyst, Girdler T-323 with 50 percent pre-reduced cobalt on a kieselguhr support, was capable of initiating decomposition at 33 C and re-start at 53 C. Even with this catalyst, the ammonia produced can be expected to exhibit strong adsorbtion properties and constitute a catalyst poison for successive re-starts. A catalyst is needed to complete the decomposition of hydrazine to nitrogen and hydrogen. (Author)

AD-285 093 Div. 4, 14
(TISTM/EJH) OTS price $.50

Naval Research Lab., Washington, D. C.
ADHESION-SHEAR STRENGTH OF ICE FROZEN TO CLEAN AND LUBRICATED SURFACES.
Interim rept.,
by T. F. Ford and O. D. Nichols. 30 Aug 62, 13p. incl. illus. tables, 17 refs. (NRL rept. no. 5832)
Unclassified report

DESCRIPTORS: *Plastics, *Metals, *Ice, *Adhesion, Surfaces, Lubrication, Oils, Silicones, Coatings, Nylon, Polymers, Ethylenes, Films, Temperature.

The adhesion-shear strength of ice to bulk plastics, plastic films, lubricated plastics, and lubricated metals has been measured at three temperatures. The bulk plastics used were nylon, polyethylene, and Teflon; the plastic films were Teflon and two polymerizable silicones. The adhesion strength of ice frozen to clean bulk nylon and polyethylene and to clean Teflon films was higher than for ice frozen to bulk Teflon. In most cases the laboratory tests show self-detachment of the ice from bulk Teflon at -1 and -20 C, but not at -6 C. Adhesion of ice to clean bulk plastics and to plastic films is low compared with that to metals, but still too high for ease of separation. Ice was removed easily from lubricated plastics. With some plastic-lubricant systems as many as 12 zero-adhesion freeze-shear-thaw cycles were obtained in laboratory tests before replenishing the lubricant; on metals, five or six cycles were possible. Experiments indicate that an effective coating must be a fluid or semifluid material on which the ice will slide and which will resist displacement by water through several icing-deicing cycles. Bis(2-ethylhexyl) sebacate and silicone greases are promising materials. (Author)

AD-285 189 Div. 4, 25
(TISTM/REB) OTS price $1.60

Textile Research Inst., Princeton, N. J.
MARKOFF CHAINS - POLYMER CHAINS,
by V. D. Gupta. Sep 62, 14p. incl. illus. table, 14 refs. (Technical rept. no. 31)
(Contracts Nonr-09000 and Nonr-09001)
Unclassified report

DESCRIPTORS: *Polymers, *Chemical bonds, Crystals, Theory, Mathematical analysis, Molecular structure.

A two-dimensional model for semicrystalline polymers is described. In the amorphous phase the polymer chains describe a random walk on a square lattice preserving the 90 degree bond angle whereas the crystalline phase is made up of regular helices. The possibility of applying the model to random coil and helix transitions is suggested. The mathematical methods of the Markoff chains is applied to deduce the useful properties of the model. (Author)

AD-285 190 Div. 4, 25
(TISTM/REB) OTS price $2.60

Rensselaer Polytechnic Inst., Troy, N. Y.
MOLTEN CARBONATES AS ELECTROLYTES: VISCOSITY AND TRANSPORT PROPERTIES,
by George J. Janz and Fumihiko Saegusa. Sep 62, 12p. illus. tables, 19 refs. (Technical rept. no. 14)
(Contract Nonr-59110) Unclassified report

DESCRIPTORS: *Carbonates, *Electrolytes, Viscosity, Transport properties, Melting, Alkali metal compounds, Lithium compounds, Sodium compounds, Potassium compounds, Eutectics.

The melt viscosities for Li_2CO_3, Na_2CO_3 and K_2CO_3 as a function of temperature to 950 C have been precisely determined. The temperature dependence of the viscosities can be expressed by the Arrhenius-type equation eta equals Ae superscript E/RT, the values for A(x10 to the 7th power) and E(kcal 1/mol) being respectively: Li_2CO_3, 141, 16.9; Na_2CO_3, 4.9, 25.7; K_2CO_3, 1.35, 29.1. The experimental values for E correspond closely to those predicted theoretically for the transport process, assuming that viscous flow is primarily controlled by migration of the carbonate ion in these melts. Electrical transport and viscous flow in carbonate and chloride melts are briefly examined. Some melt viscosities for the ternary eutectic mixture are reported, but interpretation awaits

precise density data. The present results indicate that simple average fluidity relations based on pure carbonates are not likely applicable to mixtures of carbonates in the molten state. (Author)

AD-285 315 Div. 4, 30
(TISTM/ODN) OTS price $1.60

Westinghouse Electric Corp., Dayton, Ohio.
GALLIUM ARSENIDE DENDRITE SINGLE CRYSTAL PROGRAM.
Interim technical documentary progress rept. no. 2, 24 June-24 Aug 62.
24 Aug 62, 16p. incl. illus. 3 refs.
(Contract AF 33(657)8162)
Unclassified report

DESCRIPTORS: *Solar cells, *Gallium compounds, *Arsenides, *Laboratory furnaces, Diffusion, Zinc, Single crystals, Phosphorus, Materials, Design, Crucibles, Temperature control, Explosions, Intermetallic compounds.

A 7 in. exploratory dendrite pulling furnace was put into operation. Construction of a 24 in. puller continues. GaAs solar cells were made by an open tube diffusion process. Preliminary results have been obtained in an investigation of the feasibility of producing a graded band gap by open tube diffusion of P into GaAs. (Author)

AD-285 345 Div. 4, 14
(TISTM/MS) OTS price $1.10

Aerospace Information Div., Washington, D. C.
SYNTHESIS AND PROPERTIES OF SCANDIUM CARBIDE AND COMPLEX SCANDIUM-TITANIUM CARBIDES.
19 Sep 62, 2p. (AID rept. no. 62-146; Trans. from Samsonov, G. V., G. N. Makarenko, and T. Ya. Kosolapova. Scandium Carbides and Complex Scandium-Titanium Carbides. IN: Akademiya Nauk SSSR. Doklady, 144: no. 5, pp. 1062-1065)
Unclassified report

DESCRIPTORS: *Carbides, *Scandium, *Titanium compounds, Transition elements, Physical properties, Hardness, X-ray diffraction analysis, Synthesis.

AD-285 432 Div. 4, 25
(TISTM/ODN) OTS price $2.60

Ultrasonics Research Lab., Western Reserve U., Cleveland, Ohio.
ULTRASONIC RELAXATION IN ELECTROLYTIC SOLUTIONS. II. THE HYDROLYSIS OF POTASSIUM CYANIDE,
by John Stuehr, Ernest Yeager and others.
1 Sep 62, 27p. incl. illus. tables (Technical rept. no. 26)
(Contract Nonr-143904, Proj. NR 384-305)
Unclassified report

DESCRIPTORS: *Ultrasonics, *Potassium compounds, *Cyanides, *Hydrolysis, Absorption, Relaxation time, Chemical equilibrium, Reaction kinetics, Theory, Enthalpy, Chemical reactions, Proton transfer, Solutions.

The kinetics of the hydrolysis of the cyanide ion have been studied by ultrasonic absorption measurements over the frequency range 30 kc to 25 mc. A single relaxation frequency has been observed which depends on concentration in the manner expected theoretically for the hydrolysis reaction. The relaxation frequency at 25 C is 450 kc for a 0.01 M solution and 950 kc for 0.05 M. The corresponding forward and reverse rate constants calculated for the reaction (CN ion + H2O equals HCN + OH ion) are K sub 1 equals 5.2 x 10 to the 4th power per sec and K sub minus 1 equals 3.7 x 10 to the 9th power at 25 C. From the magnitude of the maximum excess acoustic absorption per wavelength (90 x 10 to the minus 6th power at 25 C for the 0.05 M solution) the partial molal volume change delta V for the process was calculated as -12.4 cu cm/mol. The temperature dependence of the relaxation frequency indicates an energy of activation for the process HCN + OH ion yields CN ion + H2O of 6 ± 2 Kcal/mol. (Author)

5. COMMUNICATIONS

AD-284 651 Div. 5, 30
(TISTP/WH) OTS price $6.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ERROR PROBABILITIES FOR ADAPTIVE MULTICHANNEL RECEPTION OF BINARY SIGNALS,
by Robert Price. 23 July 62, 58p. incl. illus. table, 37 refs. (Technical rept. no. 258)
(Contract AF 19(628)500)
(AFESD TDR 62-129) Unclassified report

DESCRIPTORS: *Data transmission systems, *Multiplex transmission, *Radio receivers, *Errors, *Probability, *Communications theory, *Digital systems, Radio signals, Noise (Radio).

Exact solution is obtained for the error probability of an adaptive receiver that is part of a multichannel communication system over which binary data are conveyed. In the adaptive receiver, noisy measurements are made of presumably nonvarying channel signal strengths and phase shifts. The measurements are then applied to the signal processing in a manner that would be optimum if the measurements were perfect. Signaling in each channel is accomplished by means of a pair of equal-energy waveforms that are orthogonal or opposites, and all channels are affected by mutually independent white Gaussian noises of identical intensities. Several receiver options are available, among them quite arbitrary effective duration and location of the measurement time interval and choice of measurement implementation. One major conclusion is that the error probability does not depend directly on the signal strengths or phase shifts in the various channels, but instead is a function of the total average power received over all channels, exclusive of the noise. The error probability increases with the number of channels, provided that the system remains unchanged. A by-product of the analysis is the error expression for the special case of nonadaptive multichannel reception of nonorthogonal signals. (Author)

AD-284 800 Div. 5
(TISTE/CAM) OTS price $11.00

Philco Corp., Palo Alto, Calif.
FSK/FM THRESHOLD IMPROVEMENT STUDY.
Technical documentary rept.,
15 Aug 62, 1v. incl. illus. 6 refs. (Rept. no. WDL-TR1870)
(Contract AF 04(695)112)
Unclassified report

DESCRIPTORS: *Radio communication systems, *Command systems, *Frequency shift keyers, *Phase modulation, Modulators, Phase shift, Design, Detectors, Electronic integrators, Radio signals, Radiofrequency pulses, Switching circuits, Timing circuits, Signal-to-noise ratio, Noise generators, Measurement, Errors, Model tests, Band pass filters, Low pass filters, Rectifiers, Experimental data, Theory.

An experimental study was undertaken to determine means of improving the threshold of the Adven FSK/PM command link. Following the construction and calibration of a proper command link simulator, the parameters, including transmitter phase deviation, modulator tone coherence and bit sequencing from the encoder, were varied in order to determine their effects on system performance. This performance was measured in terms of the pre-detection S/N as a function of the bit error rate. In addition to these S/N versus the bit error rate curves, considerable supporting data were obtained in the form of time waveform photographs, spectrum photographs and plots, and system response curves. The results indicate the desirability of using coherent tones and premodulation filtering in the transmitter as well as the obvious need for an optimum detector. Theoretical investigations of the bit sync problem in the receiver emphasize the need for additional work to investigate a number of interesting detection schemes. (Author)

AD-284 865 Div. 5
(TISTE/CRJ) OTS price $7.60

Signal Corps, Washington, D. C.
FIELD PROCEDURES FOR COMPUTING HIGH FREQUENCIES FOR COMMUNICATIONS CIRCUITS BASED ON LONG TERM PROPAGATION PREDICTIONS (A SHORT GRAPHICAL METHOD).
Jan 61, 63p. incl. illus.
Unclassified report

DESCRIPTORS: *Radio communication systems, Communication systems, Radio signals, Radio waves, Propagation, High frequency, Very high frequency, Reliability, Sunspots.

The short graphical method - long term Maximum Useful Frequencies (MUF) and Optimum Traffic Frequencies (FOT) charts are designed to provide approximate values where only the general range of frequencies are required. When the requirement for sunspot numbers falling between zero and 130 exists, both should be worked out and visual interpolation between them will provide the approximate values for a given sunspot number. (Author)

AD-285 036 Div. 5, 1
(TISTE/CRJ) OTS price $1.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF AIRBORNE INSERTION-DISPLAY EQUIPMENT.
Final rept.,
by Carlo Yulo and V. E. Turner. June 62, 14p. incl. illus. tables.
(Proj. 112-12-131X)
Unclassified report

DESCRIPTORS: *Display systems, *Data processing systems, *Data transmission systems, *Radio communication systems, Airborne, Tests, Digital systems, Coding, Radio equipment, Communication systems, Communication equipment, Photoelectric shutters.

The installation and checkout of the simplified Airborne Insertion-Display Equipment (AIDE) was accomplished. Modifications were required to establish satisfactory performance. Ground and flight tests were conducted to determine the capabilities and limitations of the AIDE. The feasibility of the novel photoelectric selection technique to position the information tapes directly from digital information was investigated. It is concluded that the AIDE photoelectric selection technique to position the message tapes directly from digital information is feasible and reliable. Furthermore, the novel method reduces the complexity and size of the airborne insertion-display device as compared to the original airborne device of the experimental ATC data link system. (Author)

6. DETECTION

AD-284 562 Div. 6, 25
(TISTE/CAM) OTS price $1.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
STUDY AND INVESTIGATION OF MILLIMETER AND SUB-MILLIMETER RECEIVER TECHNIQUES.
Quarterly rept. no. 1, 1 Mar-1 June 62, 15 July 62, 14p. incl. illus. tables, 3 refs.
(Contract AF 30(602)2456, Proj. 4505)
(RADC TDR 62-385) Unclassified report

DESCRIPTORS: *Microwaves, *Infrared detectors, *Infrared optical systems, *Radar receivers, *Infrared receivers, *Transmission lines, Detectors, Bolometers, Ferroelectric crystals, Hysteresis, Ceramic materials, Single crystals, Interferometers, Impedance matching, Cavity resonators, Waveguide couplers, Electromagnetic lenses, Ferroelectric materials.

Research is concerned with new electromagnetic detection techniques usable in the submillimeter frequency band, and transmission lines and transmission line components usable in the submillimeter region. The pyroelectric effect detector was investigated in more detail. In order to measure crystal saturation and polarizability, hysteresis loop measurements were made on several ceramic materials and on single crystal materials. The ceramic materials tested were found to be unsatisfactory for this application. A detector was constructed using a $BaTiO_3$ crystal and initial testing has begun. Frequency and impedance measurements were made with the Michelson interferometer in conjunction with the beam waveguide. An investigation was made into various resonator coupling techniques. A grating coupler was found to be the most efficient scheme. (Author)

AD-284 575 Div. 6, 8
(TISTW/DLW) OTS price $9.60

Naval Research Lab., Washington, D. C.
A VHF-UHF MISSILE- AND SPACE-RESEARCH RADAR WITH A 150-FOOT STEERABLE ANTENNA,
ed. by L. V. Blake. 27 Aug 62, 107p. incl. illus. tables, refs. (NRL rept. no. 5801)
Unclassified report

DESCRIPTORS: *Search radar, *Guided missile tracking systems, *Radar tracking, *Parabolic antennas, *Radar echo areas, *Radio astronomy, Very high frequency, Ultra high frequency, Radar ranges, Detection, Signal-to-noise ratio, Satellite vehicles, Guided missiles (Surface to surface), Installation, Aircraft, Design, Construction, Radar antennas, Aerial targets, Radar equipment.

A high-performance vhf-uhf radar system, with a 150-foot paraboloidal-reflector antenna, was constructed at the NRL's Chesapeake Bay Annex, for missile and space research. The frequencies will initially be 138.6 and 435 mc, with pulse power of 500 kw, and pulse lengths of 100 and 12.8 microseconds, respectively. The ranges for 20-db signal-to-noise ratio on a one-square-meter target at these frequencies are calculated

to be 330 and 410 nautical miles. For zero-decibel signal-to-noise ratio the ranges are 1040 and 1290 nautical miles. Signal-to-noise ratios for echoes from the moon are estimated to be 23 db and 20 db, at these two frequencies. The CBA location will allow observation of rockets and missiles launched from the NASA Wallops Island station, 70 miles distant, and from Cape Canaveral, 640 miles distant. In the latter case, the rockets will be above the radar horizon when they reach an altitude of 55 miles. The system will be used primarily for determining the radar-echo characteristics of missiles, satellites, and other space targets, and for studies in radar and radio astronomy, including possibly ionospheric and exospheric electron-density determinations. Other possible applications are planet detection, space-probe tracking and communication, cosmic and solar noise study, and bistatic experiments. (Author)

AD-284 666 Div. 6
(TISTW/DLW) OTS price $3.60

Boeing Co., Benton, Wash.
STUDY OF ADVANCED SOLID-STATE INFRARED DETECTORS.
Interim engineering rept. no. 6, 15 May-15 Aug 62,
by Donald W. Nyberg. 15 Aug 62, 27p. incl. illus. tables, 17 refs. (Document no. D6-8896)
(Contract AF 33(616)7549)
Unclassified report

DESCRIPTORS: *Infrared detectors, *Bolometers, *Infrared phosphors, *Infrared optical materials, Dielectric properties, Solid state physics, Infrared equipment, Semiconductors, Silicon, Single crystals, Signal-to-noise ratio, Photomultipliers, Tests, Glycines, Sulfates.

Research concerns advanced methods of infrared detection with bolometers and with optically pumped phosphors. Efforts were concentrated on triglycine sulphate bolometers which exhibit a second-order transition. Work with semiconductor bolometers was devoted to measuring the operating parameters and the performance of single crystal silicon bolometers and to developing a technique for simultaneously depositing, in vacuo, a silicon bolometer element and its electrical leads onto a mica substrate. Experiments on the phosphor IR detector program were devoted to the thermal glow curve analysis and the measurement of IR stimulability of ZnS:Cu,Sc, GaP, and SrS:Eu,Sm phosphors. (Author)

AD-284 675 Div. 6
(TISTW/DLW) OTS price $3.60

Hudson Labs., Columbia U., Dobbs Ferry, N. Y.
PRELIMINARY MEASUREMENTS OF THE APPARENT NOISE FROM SHIP SUSPENDED HYDROPHONES. PART I: GRENADA TROUGH. PART II: BERMUDA AREA.
Rept. for 1 May 61-28 May 62,
by C. S. Clay, H. B. Sherry, and G. Glaser.
July 62, 28p. incl. illus. (Rept. no. CU-121-62-ONR-266-Phys; Technical rept. no. 91)
(Contract Nonr-26684)
Unclassified report

DESCRIPTORS: *Hydrophones, *Underwater sound equipment, *Ship noise, Towed bodies, Noise, Towing cables, High-pass filters, Vibration, Electric cables, Measurement, Signal-to-noise ratio, Interference, Reduction.

The apparent noise observed by hydrophones suspended from an anchored ship was measured in half octave bands from 90 cps to 1000 cps. The hydrophone depths range from 2500 ft to 4000 ft. Qualitative observations indicated that noise less than 10 cps might be due to vibrations caused by eddies shed from the cable in the currents. The tests were made in the eastern Caribbean in about 10,000 ft of water. A second set of similar measurements made in the Bermuda area in about 15,000 ft of water gave about the same or slightly higher apparent noise levels. Some evidence that high level impulses may result from rubbing of the cable against the ship's bottom rather than from jerking of the cable as the ship rolls is presented. Also the data taken in silent and normal operating ship indicate that silent ship operation decreased the noise 3 to 5 db. (Author)

AD-284 905 Div. 6, 25
(TISTB/CAM) OTS price $4.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
STUDY AND INVESTIGATION OF MILLIMETER AND SUB-MILLIMETER RECEIVER TECHNIQUES.
Technical documentary rept. no. 1, 1 Mar 61-28 Feb 62.
1 June 62, 43p. incl. illus. table, 32 refs.
(Contract AF 30(602)2456, Proj. 4505)
(RADC TDR 62-313) Unclassified report

DESCRIPTORS: *Microwaves, *Infrared detectors, *Infrared optical systems, *Radar receivers, *Infrared receivers, Detectors, Crystal video receivers, Crystal rectifiers, Bolometers, Electromagnetic waves, Infrared radiation, Dielectrics, Ferroelectric crystals, Temperature, Polarization, Antiferromagnetism, Crystals, Magnetostriction, Magneto-optic rotation, Hall effect, Semiconductors, Superconductors, Wave transmission, Waveguides, Electron beams, Focusing, Electromagnetic lenses, Microwave equipment, Mathematical analysis, Cavity resonators, Transmission lines.

Efforts were made to develop video electromagnetic detection schemes which are usable in the millimeter-infrared region. The analysis and evaluation of pyroelectric effect detectors and antiferromagnetic detectors is presented. Antiferromagnetic detectors appear feasible if their low temperature requirement is acceptable. Other detection schemes which are discussed but which have not been fully investigated include Hall effect devices, photodetection schemes, electron heating in intrinsic semiconductors, and superconducting devices. A Goubau beam type waveguide with a design frequency of 75 kmc was constructed for use in evaluating detection schemes. The design data for this transmission line is presented along with loss measurements. To aid in making measurements on the line, a resonator and a Michelson interferometer was constructed. The problems associated with efficient launching of the beam modes and with focusing the beam waveguide distributions for detection purposes were also investigated. (Author)

AD-285 200 Div. 6
(TISTW/RD) OTS price $10.10

System Development Corp., Santa Monica, Calif.
AN/GPS-T2 ACTER ALIGNMENT PROCEDURES FOR MANUAL AIR DEFENSE ENVIRONMENTAL TRAINING,
by Alan M. Mowbray. 19 Apr 62, 122p. incl. illus. tables (Technical memo. no. TM-643/000/01)
(Contract AF 30(635)24387)
Unclassified report

DESCRIPTORS: *Radar target position simulators, *Radar trainers, *Radar antijamming, Radar targets, Simulation, Cathode ray tubes, Plan position indicators, Sweep generators, Radar equipment.

Information is presented for aligning and adjusting the Radar Signal Simulator, AN/GPS-T2; the

Anti-Countermeasures Trainer (ACTER), and associated radar equipment, when these equipments are employed for manual system training. Section 1 contains a brief description of the AN/GPS-T2 and the ACTER, and their operational relationship with the radar site. Section 2 contains the AN/GPS-T2, ACTER, and radar receiver pre-problem alignment procedure which should be followed prior to an STP exercise. Section 3 contains a comprehensive AN/GPK-T2 alignment procedure which should be followed when the simulation equipment is initially installed, when periodic maintenance checks are performed, or when a major component is replaced. This Section must be used in conjunction with the ACTER alignment procedure in Section 4 to ensure a complete alignment with both equipments. Section 5 describes the new S-III alignment leader. Section 6 contains the comprehensive ACTER alignment procedure utilizing the new S-III film. (Author)

AD-285 247 Div. 6
(TISTW/RD) OTS price $8.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
EVALUATION OF AN EXPERIMENTAL LASER-RANGING SYSTEM.
Master's thesis, by Alton B. Todd. Aug 62, 83p. incl. illus. tables, 8 refs. (Rept. no. GA/EE/62-4)
Unclassified report

DESCRIPTORS: *Lasers, *Range finding, Signal-to-noise ratio, Interference, Scattering, Light, Design, Reflection, Solar spectrum, Photomultipliers, Optical equipment.

A simple Laser-ranging system was built and experimentally evaluated regarding signal-to-noise-ratio versus range attainable. The transmitter consists of a technical research group model V-2909 commercial Laser equipment and a collimator to reduce the beamwidth. The receiver consists of a 36-in. parabolic mirror focused on an RCA 7265 photomultiplier. The dominant sources of noise in the system are background sunlight and backscattering of Laser energy. Measurement of interference owing to sunlight for targets of high reflectance shows a slightly decreasing value with range which agrees with theory presented, but a general level 8 db higher than predicted. Measurements of backscattering received show the characteristic rapid buildup and leveling off with range predicted by the theory and a very comparable magnitude. Return signal strength vs range was determined by extrapolation of measurements on one target. This was compared with the sum of the two dominant noise sources to obtain signal-to-noise-ratio. Measured signal-to-noise-ratio, thus obtained compares favorably with the predicted value except for a greater day-night difference resulting from the greater than predicted sunlight interference. (Author)

AD-285 450 Div. 6
(TISTW/RD) OTS price $1.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
FIELD TEST OF SOLO MOUNTED IN AN HU-1 HELICOPTER, by C. C. Haines. Aug 62, 11p. incl. illus. (Test rept. no. T63-2-1)
(Proj. 503-05-020)
Unclassified report

DESCRIPTORS: *Optical tracking, *Tracking, Helicopters, Flight testing, Optical equipment, Test equipment, Test methods, Tanks, Passenger vehicles, Airborne, Surface targets.

A SOLO tracking unit was obtained by Frankford Arsenal from Chicago Aerial Industries Inc. for flight test evaluation. SOLO, derived from 'Selective Optical Lock-On;, is an automatic passive tracking technique which is dependent upon the light gradient (contrast) of the target for performance. The demonstration model of SOLO was installed and tested in an HU-1 helicopter by Frankford Arsenal personnel. The tests were conducted at Aberdeen Proving Ground through September and mid October 1961. The results of these tests indicated that this demonstration model of SOLO would generally track to a 3 mil radial maximum error on such targets as tanks, jeeps, helicopters in flight, personnel carriers, shrubbery and tress. A film, covering the flight program, was edited by Frankford Arsenal and serves as the principal means of indicating tracking performance. (Author)

AD-285 508 Div. 6
(TISTW/RD) OTS price $1.10

Syracuse U. Research Corp., N. Y.
SUBCLUTTER VISIBILITY FIELD TEST FOR NON-COHERENT PULSE DOPPLER RADARS,
by George E. Mader. 21 Dec 59, 4p. incl. illus. 3 refs. (Special rept. no. R-30)
(Contract Nonr-255600)
Unclassified report

DESCRIPTORS: *Doppler radar, *Radar targets, Tests, Moving target indicators, Voltmeters, Radar interference, Detection.

Subclutter visibility is a system check for pulse doppler radars and is a basis for radar comparison. When special laboratory instruments are unavailable, this measurement may be accurately performed using two types of voltmeters. A seven-step procedure is outlined. (Author)

AD-285 578 Div. 6
(TISTW/RD) OTS price $4.60

Philco Corp., Palo Alto, Calif.
REFRACTION CORRECTIONS FOR TRACKING DATA.
13 Sep 62, 44p. incl. illus. tables, 46 refs. (Rept. no. WDL-TR1903)
(Contract AF 04(695)113)
Unclassified report

DESCRIPTORS: *Atmospheric refraction, *Satellite vehicles, *Extraterrestrial radio waves, Errors, Radio waves, Radio signals, Diurnal variations, Atmosphere, Ionosphere, Corrections, Tracking, Detection.

A computer program is described which calculates the corrections in elevation angle needed to compensate for atmospheric refraction. Typical correction curves are given for six Philco tracking stations. Included are discussions of refraction and of the mathematical model used. (Author)

7. ELECTRICAL EQUIPMENT

AD-284 522 Div. 7
(TISTM/TCG) OTS price $1.10

New York State Coll. of Ceramics, Alfred U.
HYDROGEN-OXYGEN ELECTRODE STUDY IN HYDROX FUEL CELLS.
Quarterly technical progress rept. no. 3, by T. J. Gray and W. A. Bridgeo. 15 Sep 62, 7p. incl. illus.
(Contract AF 33(657)7564)
Unclassified report

DESCRIPTORS: *Fuel cells, *Electrodes, *Hydrogen, *Oxygen, Electric potential, Mercury compounds, Oxides, Catalysts, Graphite, Wetting agents, Platinum, Crystallization, Impregnation, Design, Preparation.

Electrode preparation procedures were developed which gave open circuit potentials of -1.05 to -1.10 v and cathode open circuit potentials of +0.13 to +0.15 v with reference to the mercury mercuric oxide electrode. X-ray diffraction and fluoresence analyses were employed to determine the form (extent of crystallization) of active catalysts and thence to serve as one guide in simplifying the preparation procedures. Wetting of the electrodes remained a serious problem. It was observed that untreated graphite electrodes are not easily wetted by 30% KOH but once the graphite is impregnated with active platinum the electrodes are wetted very quickly by 30% KOH. It was necessary to use special antiwetting agents such as paraffin on catalyst impregnated graphite electrodes. (Author)

AD-284 809 Div. 7, 25
(TISTP/WH) OTS price $3.60

Rensselaer Polytechnic Inst., Troy, N. Y.
THEORETICAL ANALYSIS OF ELECTROCHEMICAL ENERGY CONVERSION SYSTEMS,
by S. B. Greene and N. D. Greene. 18 July 62, 36p. incl. illus. table (Scientific rept. no. 1)
(Contract AF 19(604)8377, Proj. 6694)
(AFCRL 62-831) Unclassified report

DESCRIPTORS: *Fuel cells, *Electrochemistry, *Electrodes, *Electric potential, Polarization, Theory.

Using the concepts of modern electrode kinetic theory, equations which express the current-voltage discharge curve and power output of a cell in terms of the kinetic parameters of the individual electrodes are derived. Two new cell parameters are defined which permit the easy characterization and comparison of cell performances. Methods for determining the presence and effects of internal resistance and concentration polarization by analysis of discharge curves are described. Two novel methods for determining the value of the internal resistance of a cell are demonstrated. Experimental verification of the theoretical concepts and equations is presented. (Author)

AD-284 876 Div. 7, 30
(TISTE/CRJ) OTS price $31.00

Technical Documents Liaison Office, Wright-Patterson Air Force Base, Ohio.
HIGH VOLTAGE TESTING EQUIPMENT AND MEASUREMENTS,
by A. Vorobyev, G. A. Vorobyev and others.
18 July 62, 716p. incl. illus. tables, 32 refs.
(Rept. no. MCL-1265/1+2)
Unclassified report

DESCRIPTORS: *Voltage, USSR, Translations, Coils, Transformers, Electrostatic generators, Rectifiers, Voltage amplifiers, Voltmeters, Pulse generators, Electric currents, Pulse transformers, Voltage dividers, Electron tubes, Pulse analyzers, Measurements, Test equipment.

Contents:
Methods and systems for penetrating high alternating voltage
Electrostatic generators and transformers
Rectifying circuits, cascade generators
Pulse voltage and current installations
Voltage measurements

AD-284 891 Div. 7, 4
(TISTM/EJH) OTS price $2.25

Westinghouse Electric Corp., Lima, Ohio.
THERMALLY ACTIVATED CERAMIC-METAL CELLS.
Final rept., May 61-Feb 62.
June 62, 83p. incl. illus. tables, 4 refs.
(Contract AF 33(616)8231, Proj. 8173)
(ASD TDR 62-397) Unclassified report

DESCRIPTORS: *Power supplies, *Electrolytic cells, *Electric power production, *Storage batteries, Solids, Electrolytes, Silver electrodes, Iron, Electrodes, Enamel coatings, Lithium compounds, Boron compounds, Silicates, Ceramic materials, Electrochemistry, Electric discharges, Ions, Conductivity.

Investigations were made of the energy conversion mechanism in thermally activated ceramic-metal cells. Research was focused upon the Fe anode, Li borosilicate enamel-electrolyte and Ag cathode cell configuration. The cell operation temperature range was 450 to 700 C with 600 C being the most satisfactory. The Ag cathode functioned as a gas electrode which absorbed O. The enamel's ionic conductivity increased with temperature and transferred O(--) from the cathode to the anode. Electric power generation resulted from the free energy of anode oxidation reaction. Chemical analyses of discharged cells indicated Li migrated in the electrolyte to the cell cathode. Recharging of cells was not successful due to the iron oxide stability; however, anomalous charge storage was noted at 450 C. Cells made of more reactive anode materials were studied.

AD-285 084 Div. 7, 4
(TISTM/EJH) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
ENERGY CONVERSION RESEARCH PROGRAM. DIRECT CONVERSION OF CHEMICAL ENERGY TO ELECTRICAL ENERGY.
Semiannual technical rept. 1 Jan-30 June 62,
by F. D. Hess and S. W. Mayer. 1 Aug 62, 8p. incl. illus. table, 5 refs. (Rept. no. TDR-69 (2220-30)TR-2)
(Contract AF 04(695)69)
(DCAS TDR 62-164) Unclassified report

DESCRIPTORS: *Fuel cells, *Solar cells, *Electrochemistry, *Power supplies, Oxidation, Chlorides, Phosphorus compounds, Reaction kinetics, Chlorine, Tungsten compounds, Antimony compounds, Organic solvents, Methyl radicals, Acetamides, Dielectric properties, Electrodes, Electric potential.

Prototype fuel cells were operated employing chlorine as oxidant, phosphorus trichloride as fuel, and methyl thiocyanate as solvent. Studies were made of pyrolytic processes for regeneration of reaction products and means of separating products. Other systems were investigated by chronopotentiometric techniques. Tungsten and antimony chlorides were found to have characteristics of special interest. (Author)

AD-285 143 Div. 7
(TISTE/CAM) OTS price $1.60

Corning Glass Works, Bradford, Pa.
NF RESISTOR FACTORIAL LOAD LIFE TEST.
Interim development rept., June-Sep 62,
by W. C. Beck. 1 Oct 62, 12p. illus. table.
(Contract NObsr-87385, Proj. SR008 0305)
Unclassified report

DESCRIPTORS: *Glass resistors, Life expectancy, Test methods, Temperature, Failure (Mechanics), Reliability, Test equipment, Data

processing systems, Quality control, Digital computers, Electric currents, Radiofrequency power.

Preparation of a test design was continued for the purpose of performing a factorial load life test on hermetically sealed glass NF resistors. Failure rate data and acceleration factor data are to be obtained on 22,000 hermetically sealed tin-oxide resistors subjected to temperatures of 75, 100 and 125 C and power dissipating levels of up to 4 times their normal rated power for 2000 hrs. Some 450 resistors are to be tested at 70 C for 10,000 hrs at their rated power. Test equipment includes an automatic data handling system, a card punching machine and a digital computer.

AD-285 203 Div. 7, 11, 25
(TISTP/JW) OTS price $8.10

Research Labs. for the Engineering Sciences, U. of Virginia, Charlottesville.
RESEARCH INVESTIGATION OF MAGNETIC AND ELECTRIC FORCES FOR ROTATING SHAFT SUSPENSION.
Technical progress rept., June-Aug 62,
by B. J. Gilpin. Oct 62, 79p. incl. illus. 13 refs. (Rept. no. EMI-4454-106-62U)
(Contract AF 33(657)8352)
Unclassified report

DESCRIPTORS: *Servo systems, *Bearings, *Induction motors, Magnetic materials, Armatures, Resonance, Magnetic cores, Electrical equipment.

The successful, but limited, operation of an induction motor without mechanical contact is reported. The system uses a radially passive bearing system and an active axial magnetic servo system. The design and construction of the servoed magnets is described along with the servo system. Various noncontacting position sensors are discussed. The work to date on the following types of noncontacting bearing systems is also given: radially active system with permanent magnet armatures; radially active system with laminated iron armature; resonant magnetic bearing system; and resonant electric bearing system. (Author)

AD-285 429 Div. 7, 26
(CAM/TISTE) OTS price $1.60

Elco Corp., Philadelphia, Pa.
PRODUCTION ENGINEERING MEASURE FOR SUBMINIATURE PACKAGING CONNECTORS.
Quarterly progress rept. no. 4, 9 Mar-9 June 62, by Alexander Wontorsky. 9 June 62, 12p.
(Contract DA 36-039-sc-85961)
Unclassified report

DESCRIPTORS: *Electric connectors, *Manufacturing methods, Subminiature electrical equipment, Design, Packaging, Production, Tests.

The redesign work is based upon packaging connectors previously produced. Certain modifications and additions, as well as material changes, covers and hardware additions were included. The preproduction samples were fabricated and released to testing. The connectors and the covers successfully passed the applicable tests. The assembly operations were analyzed. (Author)

AD-285 568 Div. 7, 4, 12
(TISTM/TCG) OTS price $3.60

Mallory, P. R., and Co., Indianapolis, Ind.
MERCURY CELL BATTERY INVESTIGATION.
Quarterly technical progress rept. no. 3, 16 June-15 Sep 62,
by J. M. Booe and R. E. Ralston. 15 Sep 62, 22p. incl. illus. tables.
(Contract AF 33(657)7706)
Unclassified report

DESCRIPTORS: *Storage batteries, *Alkaline cells, *Electrolytic cells, *Mercury electrodes, *Power supplies, Electrodes, Electrode holders, Battery separators, Anodes (Electrolytic cells), Cathodes (Electrolytic cells), Palladium, Potassium compounds, Hydroxides, Porous materials, Carbon, Resistance, Satellite vehicles, Chemical reactions, Materials.

Chemical reactivity rate determination was directed toward improving precision and reliability. Data are presented showing the effects of several variables studied during this period. A plastic version of the exploratory research cell which will accommodate the compartmented liquid anode retainer was fabricated. This design was successfully used in discharge experiments with the negative electrode to study electrode spacings. An alternating current method of separator resistance measurement was evaluated. The characteristics of several membrane type separators after exposure to degrading environments are presented. The use of palladium in the positive electrode continued to show high efficiency with respect to charge acceptance. Porous forms of carbon were studied as possible expanders to control positive electrode densification. Automatic cycle test life of some experimental cells passed 1000 cycles. Preliminary specimens of the liquid anode retaining member for this larger test cell were produced. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-284 555 Div. 8, 14, 26
(TISTM/MS) OTS price $1.60

Cornell-Dubilier Electric Corp., New Bedford, Mass.
PEM FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200 C.
Quarterly rept. no. 5 for period ending 27 July 62,
by Lawrence E. Nordquist. 27 July 62, 1v. incl. illus.
(Contract DA 36-039-sc-85955)
Unclassified report

DESCRIPTORS: *Capacitors, *Ceramic capacitors, *Dielectrics, *Barium compounds, *Titanates, Calcium compounds, Fluorination, High temperature research, Encapsulation, Industrial production, Dielectric properties, Manufacturing methods, Production.

Fluorinated ceramic capacitors, CK63 style, capable of operating at 200 C, were successfully manufactured. Skills and technology required to glass coat ceramic capacitors were attained. Equipment designed for this purpose has been constructed. A silicone RTV rubber dip has proven to be a satisfactory covering over the glass and the combination has given maximum protection to the unit under all environmental test conditions. A pilot run fluorination kiln, meeting production requirements of this contract, has been constructed. (Author)

AD-284 558 Div. 8, 25
(TISTM/MS) OTS price $2.60

Grace, W. R., and Co., Clarksville, Md.
REPRODUCIBLE THERMISTOR REFINEMENT PROGRAM.
Interim technical progress rept., 5 June-4 Sep 62,
by M. C. Vanik, W. T. Barrett and others. Sep 62, 15p. incl. illus. tables.
(Contract AF 33(657)7104, Proj. 7-838)
(ASD 7-838, vol. 4) Unclassified report

DESCRIPTORS: *Thermistors, *Semiconductors, *Silicon, *Single crystals, Temperature sensitive elements, Chemical impurities, Gold, Sensitivity, Reliability, Reproduction, Manufacturing methods, Production, Impurities.

Contact improvement yielded stable thermistors of gold-doped P-type silicon. Similar techniques are being used on gold-doped N-type silicon. The unbalanced pilot line has been operated according to a 24 step manufacturing process. More experience at operating the silicon thermistor pilot line could result in the elimination of several steps. The size adjustment step is important as far as yield in a given range is concerned. Yields of 70% should be easily obtainable. Gold-doped N-type silicon will be more difficult to stabilize than gold-doped P-type silicon. In N-type silicon the carrier concentration is so small that any increase or decrease caused by a slightly non-ohmic contact can result in erratic behavior. Sub-layers of antimony showed the best results in stabilizing gold-doped N-type silicon. Heat treating the sub-layers at 1200 C is desirable. Application of the sub-layers of aluminum or antimony and the subsequent nickel plating are critical. Any errors can result in contacts which are poor mechanically and electrically. (Author)

AD-284 600 Div. 8
(TISTM/MS) OTS price $.50

Politecnico di Milano (Italy).
RESEARCHES ON HYDROGEN OVERVOLTAGE ON METALLIC SINGLE CRYSTALS; GOLD.
Interim rept. 1 July-30 Sep 61 on Hydrogen Evolution,
by L. Peraldo Bicelli and M. Graziano. June 62, 13p. incl. illus. table, 7 refs.
(Contract AF 61(052)144, Proj. 7353)
(ASD TDR 62-356) Unclassified report

DESCRIPTORS: *Single crystals (Metallurgy), *Gold, *Voltage, Cathodes, Single crystals, Electrodes, Measurement, Electrical properties, Hydrogen.

Hydrogen overvoltage on gold polycrystalline and single crystal-cathodes, oriented following the (100), (110), and (111) planes, has been investigated in 0, 1 M perchloric acid solutions, in a c. d. range up to 200 A/m(2). The Tafel law holds true, but two different slopes are observed, that in the lower c. d. range having the smallest value. The parameters are different for the different electrodes. (Author)

AD-284 625 Div. 8
(TISTE/CAM) OTS price $16.00

General Electric Co., Syracuse, N. Y.
SOLID STATE MICROELECTRONIC SYSTEMS PROGRAM.
Final rept., 1 July 61-30 June 62,
by R. Warr, L. Ragonese, and G. Danielson. 31 June 62, 242p. incl. illus. tables.
(Contract DA 36-039-sc-87466)
Unclassified report

DESCRIPTORS: *Microminiaturization (Electronics), *Electronic circuits, Digital systems, Electronic equipment, Switching circuits, Diodes, Transistors, Design, Reliability, Standards, Failure (Mechanics), Computer logic, Analysis, Equations, Probability, Time, Theory, Electric currents, Radiofrequency power, Measurements, Solid state physics, Temperature, Synthesis.

Investigations were carried out to assess the merits and limitations of the various forms of microelectronic circuitry. Specific tasks were conducted to provide design criteria and information with the objective of improving microelectronic design and evaluation procedures. Solutions are given to the problem of how to design minimum power dissipation circuits. The effects of power dissipation, circuit tolerance, component tolerance and temperature on circuit reliability are considered. Solutions to the problem of attaining maximum circuit reliability are presented. The evaluation of various forms of microelectronic circuitry when only a limited number of terminals are available is described. The results of studies in the area of adjustability are presented. (Author)

AD-284 678 Div. 8
(TISTP/FR) OTS price $1.00

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
DISCHARGE EFFECTS IN A CESIUM DIODE,
by James Lawson Coggins. 15 Aug 62, 29p. incl. illus. tables, 11 refs.
(Contract AF 33(616)7624, Proj. 8173)
(ASD TDR 62-412) Unclassified report

DESCRIPTORS: *Diodes, *Thermionic emission, *Space charges, Cathodes, Anodes, Cesium, Ions, Electrons, Atoms, Ionization.

The feasibility of neutralizing the electron space charge in a cesium thermionic converter with ions formed by the collisions of electrons with neutral atoms was investigated. Equations were set up for the ion density and subsequent potential function for a low-pressure plasma in which the ions are formed by collisions of atoms with electrons emitted from the cathode with a Maxwellian velocity distribution. The special case of zero field at the emitter was taken to simplify the mathematics. Voltage-versus-current characteristics were determined experimentally for a cesium diode with a low work-function impregnated tungsten emitter operating at 1410 K and an electrode spacing of 0.254 cm. Cesium vapor pressures corresponding to condensation temperatures of 30 C, 100 C, and 155 C were used. The results indicated that higher cesium pressures, leading to more dense plasmas and successive collisions between electrons and excited atoms, are needed for complete space-charge neutralization. (Author)

AD-284 691 Div. 8
(TISTE/CAM) OTS price $2.60

Hughes Aircraft Co., Culver City, Calif.
AN EXPERIMENTAL NEGATIVE-CONDUCTANCE SLOT AMPLIFIER AT 6 GC,
by M. C. Behnke and A. P. King. July 62, 21p. incl. illus. 17 refs. (Scientific rept. no. 4)
(Contract AF 19(604)8386, Proj. 4600)
(AFCRL 62-583) Unclassified report

DESCRIPTORS: *Slot antennas, *Diodes, *Microwave amplifiers, Feasibility studies, Electronic scanners, Super high frequency, Waveguides, Waveguide couplers, Electronic circuits, Impedance matching, Negative resistance circuits, Resonance, Design, Satellite vehicles, Noise (Radio), Reduction.

A description is presented of an experimental study of a tunnel diode amplifier to provide signal gain for the slot elements employed in an experimental simultaneously scanned antenna array. Each slot element comprised a resonant slot coupled to the waveguide broadwall. The diode was asymmetrically placed in the slot to transform the diode impedance to that of the antenna slot. Features of this amplifier include design simplicity, light weight, and with suitable circuitry a low noise figure. These devices are relatively radiation resistant and offer possibilities for future consideration in space vehicle application. Experimental results at 6 kmc have yielded gains in excess of 15 db with commercially available diodes. With suitable circuitry a lower noise figure than obtained with a conventional balanced crystal converter can be expected. Noise figures in the 5-7 db range at frequencies up to 10 kmc can be obtained with the use of circulators. Some consideration of the noise problem with tunnel diodes is included. (Author)

AD-284 788 Div. 8
(TISTE/CAM) OTS price $6.60

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
INVESTIGATION OF NOISE GENERATION IN ELECTRICALLY TUNABLE MICROWAVE OSCILLATORS.
Quarterly progress rept. no. 7, 15 Mar-15 June 62,
by G. C. Dalman, P. R. McIsaac, and L. A. MacKenzie. 15 June 62, 64p. incl. illus. refs.
(Research rept. no. EE 533)
(Contract DA 36-039-sc-87368)
Unclassified report

DESCRIPTORS: *Microwave oscillators, *Backward-wave-oscillators, *Traveling wave tubes, *Noise (Radio), *Noise (Radar), Signal-to-noise ratio, Microwave equipment, Intermediate frequency amplifiers, Frequency modulation, Measurement, Reflex klystrons, Transducers, Tuning devices, Reduction, Electron beams, Test equipment, Theory, Equations, Matrix algebra, Differential equations, Partial differential equations, Tests.

The self- and cross-spectra of the frequency modulation and beam current noise of two VA 161's and a QK 610 were measured. In both cases there are distinct indications of noise mechanisms peculiar to low frequencies present. The noise transformation properties of active beam transducers are compared with passive transducers for application in linear-beam microwave tubes. A nonlinear theory of traveling-wave tubes that includes both space and time harmonics is presented. A new series of noise measurements were made in a linear electron beam of moderate power. Since the particular gun used for this experiment is a shielded Pierce-type gun, emphasis is on the noise behavior of the beam near Brillouin flow conditions. (Author)

AD-284 793 Div. 8, 30
(TISTE/CAM) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOME RELIABLE REDUNDANT CIRCUITS,
by Rein Teoste. 7 June 61, 25p. incl. illus. 4 refs. (Rept. no. 21G-8001)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: *Electronic circuits, *Digital computers, Circuits, Switching circuits, Electronic relays, Electric connectors, Radiofrequency oscillators, Theory, Mathematical analysis, Electronic equipment, Electronic switches, Failure (Mechanics), Reliability, Design.

Typical redundant digital computer circuits which have been designed and built are described. Also, theoretical reliability curves are shown for the redundant circuitry in comparison to non-redundant reliability curves. Experiments with hardware showed that reliable redundant circuits can be built with no difficulty. The reliability calculations show that if possible Moore-Shannon redundancy should be chosen over the gate connector redundancy, and when Moore-Shannon redundancy is used, it may be desirable to make redundant only components which are relatively unreliable at the start. The experimenting has shown that detection of failed components in redundant circuitry is quite hard. Gate connector redundancy is considerably better in this respect. (Author)

AD-284 801 Div. 8, 30
(TISTE/CRJ) OTS price $2.60

Philco Corp., Palo Alto, Calif.
ANTENNA CALIBRATION SIMULATOR PROGRAM UTILIZATION (EDCB AND EDCC).
Technical documentary rept.
2 Aug 62, 15p. illus. tables (Rept. no. WDL-TR1886)
(Contract AF 04(695)113)
Unclassified report

DESCRIPTORS: *Antennas, *Aerial cameras, *Flight simulators, Simulation, Aerial photography, Flight paths, Airborne, Programming, Computers, Calibration.

Two computer programs were developed as an aid to the design of antenna calibration flight plans by photogrammetric triangulation. The first, EDCB,

computes antenna angular velocities and accelerations for a specified flight plan and determines the associated camera coverage for a particular camera configuration. The second, EDCC, calculates the dilution of precision in the calibration due to the least-squares triangulation and to the camera capabilities. (Author)

AD-284 843 Div. 8, 6
(TISTE/CAM) OTS price $7.60

Westinghouse Electric Corp., Baltimore, Md.
RESEARCH AND DEVELOPMENT OF A MAGNETIC MODULATOR.
Final engineering rept.
3 July 62, 72p. incl. illus. tables.
(Contract NObsr-77638)
Unclassified report

DESCRIPTORS: *Magnetic modulators, Capacitors, Transistors, Diodes, Rectifiers, Semiconductors, Modulators, Silicon, Dielectrics, Trigger circuits, Switching circuits, Feedback, Temperature, Cooling, Solid state physics, Saturable reactors, Magnetic core switches, Pulse generators, Time, Model tests, Design.

The investigation of problems associated with magnetic modulators which produce a very short pulse and in building and testing a prototype modulator under extreme conditions is discussed. The major areas of investigation were: circuit configuration study, including distributive constants approach; solid state switching; low-loss dielectric capacitors; minimizing core volume vs. pulse compression; saturable reactor winding techniques; saturable reactor impregnants; minimizing losses in the bias supply; minimizing leakage inductance; jitter and pulse position control; pulse forming network study; and, magnetic and conventional modulator comparison. The results of the investigations were used to determine the design of a specified prototype modulator. From the information obtained from the tests of this prototype unit, it is now feasible to construct a modulator which will actually meet all of the original design goals. (Author)

AD-284 920 Div. 8
(TISTP/WH) OTS price $5.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
INTERPRETATION OF THE SIMULTANEOUS PHASE AND AMPLITUDE FLUCTUATIONS OF IONOSPHERICALLY REFLECTED 60 KC/S RADIO WAVES,
by W. Sawchuck. 15 Aug 62, 48p. incl. illus. table, 19 refs. (Scientific rept. no. 167)
(Contract AF 19(604)4563, Proj. 8605)
(AFCRL 62-836) Unclassified report

DESCRIPTORS: *Ionosphere, *Radio waves, *Statistical analysis, *Reflection *Low frequency.

A theoretical development is carried out to obtain the auto- and cross-correlation functions for vertical incidence phase and amplitude fluctuations of ionospherically reflected long radio waves. Six months of such data obtained at 60 Kc are presented and interpreted in terms of the above theory. Methods for determining the heights of the irregularities producing these fluctuations are outlined. It is concluded that the data may be interpreted on the basis of a phase screen at a height in the neighborhood of 89 to 107 Km. (Author)

AD-284 948 Div. 8
(TISTE/CRJ) OTS price $16.50

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
THEORY OF TRAVELING-WAVE TUBES AND AN ANALYSIS OF BACKWARD-WAVE OSCILLATORS.
Technical rept. no. 8 on Microwave Noise,
by H. R. Witt. 1 Apr 62, 230p. incl. illus. 43 refs. (Research rept. no. EE 527)
(Contract DA 36-039-sc-84524)
Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Backward wave oscillators, Analysis, Theory, Mathematical analysis, Differential equations, Harmonic analysis, Partial differential equations, Numerical analysis, Taylor's series.

A linear theory for traveling-wave tubes, based upon a normal mode expansion of a periodic slow-wave circuit, was developed. The distinctive feature of the theory is that as many space harmonics as desired can be included in an analysis. If a full set of space harmonics are included, an infinite number of possible modes are predicted rather than the four modes of conventional theory. The theory reduces to the forward-wave amplifier theory of Pierce if only the dominant pair of space harmonics for forward-wave interaction are included, whereas it reduces to Johnson's theory of the backward-wave amplifier and backward-wave oscillator if only the dominant pair of space harmonics for backward-wave interaction are included. The normal-mode expansion was also used to develop a nonlinear theory for traveling-wave tubes that allows both space harmonics and time harmonics to be taken into account. An analysis of the backward-wave oscillator was carried out using the nonlinear theory, assuming that only interaction with the backward-wave space harmonic at the fundamental frequency is significant. (Author)

AD-284 963 Div. 8, 13, 30
(TISTE/CRJ) OTS price $3.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
DESIGN AND CONSTRUCTION OF A 100-FOOT OSCILLATING NONMETALLIC TOWER,
by Charles W. Lyle. July 62, 32p. incl. illus. 3 refs. (BRL memo. rept. no. 1419)
Unclassified report

DESCRIPTORS: *Towers, *Antennas, Wood, Design, Construction, Antenna radiation patterns, Helical antennas, Antenna masts, Test equipment, Measurement, Test facilities.

The purpose of the research facility is to probe the volume of space over a ground-located antenna without disturbing the electromagnetic field, specifically to determine radiation phase, polarization, and amplitude contours. Design and construction are presented of a highly rigid, lightweight, oscillating, nonmetallic tower. It is shown that wood is the best material to use. Solutions to the design problems pertaining to the use of wood are offered. The tower is shown to have a maximum deflection of only three inches under its own weight. This value increases by 1/4 inch for each five pounds of payload. Drawings and photographs are included in the Appendix. (Author)

AD-285 005 Div. 8
(TISTE/CRJ) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
ACTIVE SINGLE-SIDEBAND PHASE SHIFTERS.
Research report,
by Neil Jagoda. July 62, 11p. incl. illus. 7 refs. (AFCRL 62-511)
(Proj. 4610)
Unclassified report

DESCRIPTORS: *Phase shifters, *Modulators, *Feedback amplifiers, Audiofrequency, Sensitivity, Capacitors, Resistors, Design, Phase measurement, Theory.

A method of realizing audio frequency 90 degrees phase shifters for use in single-sideband modulators is described. The method assumes a phase approximation in the Tchebycheff sense is available, and uses two all-pass networks whose phase difference approximates 90 degrees. The outputs are unbalanced to ground thereby avoiding differencing networks. The method described is an active RC bridged-T network. These sections can be cascaded to realize any order of approximation. The absence of inductors allows very low frequency performance to be obtained. Design formulas are developed and sensitivity considerations are discussed. (Author)

AD-285 039 Div. 8
(TISTE/CRJ) OTS price $1.60

Motorola, Inc., Phoenix, Ariz.
MINIATURE THIN-FILM INDUCTORS.
Interim development rept. no. 5, 1 June-1 Sep 62, by F. R. Gleason. 1 Oct 62, 12p. incl. illus.
(Rept. no. 2631-15)
(Contract NObsr-85397)
Unclassified report

DESCRIPTORS: *Radiofrequency coils, *Miniature electronic equipment, *Manufacturing methods, Thin films, Ferrites, Ferromagnetic materials, Inductance, Magnetic properties, Measurement, Gold, Platinum, Processing, Copper, Production..

The problem of reducing air gap effects in the assembly of copper-conducting spirals with bulk ferrites is reviewed. Methods are discussed for overcoming this effect by providing recessed areas for accommodating the coils in the ferrite. Also reviewed are the problems encountered in the control of the ferrite-film deposition process to achieve more reproducible films. Methods for the measurement of the magnetic, compositional, and structural properties of the deposited films are discussed. The application of flat spiral coils of gold to the ferrite film, followed by a second deposition of ferrite films, is also discussed. The density of the ferrite films is shown to be comparable to that of a bulk ferrite sample of like composition. (Author)

AD-285 049 Div. 8
(TISTE/CRJ) OTS price $1.60

Microwave Associates, Inc., Burlington, Mass.
HIGH POWER CAPABILITIES OF WAVEGUIDE SYSTEMS.
Quarterly progress rept. no. 6, 1 May-31 July 62, by Meyer Gilden and John Antonucci. 31 July 62, 6p. illus.
(Contract NObsr-85190)
Unclassified report

DESCRIPTORS: *Waveguides, *Radiofrequency power, Electric fields, Reliability, Pressure, Measurement, Diffusion.

The concept and utility of the diffusion length is discussed. An example is given of its application to the solution for electric field strength at breakdown. Close to breakdown threshold, the diffusion length varies rapidly, further increasing the sensitivity of breakdown to pulse length. This is illustrated in terms of percent over-voltage. (Author)

AD-285 052 Div. 8
(TISTW/DLW) OTS price $1.60

Naval Missile and Astronautics Center, Point Mugu, Calif.
AN AID FOR PREDICTING RADAR REFRACTION IN THE POINT MUGU AREA.
by J. W. Stanfield. 27 Sep 62, 18p. incl. illus. table, 2 refs. (Technical memo. no. NMC-TM-62-44)
Unclassified report

DESCRIPTORS: *Atmospheric refraction, *Radar signals, *Radio waves, California, Air mass analysis, Refraction, Microwaves, Radar ranges, Atmosphere, Climatic factors, Distortion, Radiofrequency, Refractive index, Propagation, Wave transmission.

A summary of propagation climatological data is compiled which is intended to aid Naval Weather Service personnel in forecasting and understanding the existing climatology of refractive-layer characteristics in the Point Mugu area. The Point Mugu area is defined as the immediate station and the area extending seaward to a radius of 75 miles. The following problems constitute the areas investigated and discussed: (1) What radar wavelengths are affected by ducting layers; (2) If ducting layers are not present, can increased radar ranges be expected for superrefractive conditions, or can decreased ranges be expected for subrefractive conditions at the transmitter site; (3) What transmitter-antenna elevation angles can be expected to be affected; (4) Where is the radar-lobe distortion (radar hole); (5) Is the ducting layer too high above the transmitter, thus causing the radar hole to be out of range; and (6) What is the horizontal extent of each type of layer. The study provides an operational foundation for the dissemination of existing measurements of atmospheric refractive index. A secondary function is to fill the need for a training aid as a ready source of information about complexities of radar propagation forecasting in the local area. (Author)

AD-285 055 Div. 8
(TISTE/CRJ) OTS price $5.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
CONCEPTS FOR VERY HIGH VERTICAL RADIATORS,
by P. J. Rush. 15 Aug 62, 51p. incl. illus. tables, 15 refs. (Technical note no. N-448)
Unclassified report

DESCRIPTORS: *Antennas, *Antenna masts, Very low frequency, Towers, Load distribution, Stresses, Wind, Gusts, Ice, Materials, Steel, Aluminum, Magnesium, Concrete, Moments, Construction, Maintenance.

The need for unconventional types of very low frequency antenna systems as alternatives to the costly conventional systems is discussed. Possibilities of using very high vertical radiators of various structural types are explored. The loads and forces that must be sustained by 3000-ft high structures are described. Materials suitable for unusual structural concepts are set forth. Concepts encompassing 3000-ft high guyed towers, compression-tension towers, free-standing towers, mass structures, and retractible towers are briefly analyzed; and structural, erection, and economic feasibilities of the various concepts are presented. It was concluded that 3000-ft high vertical radiators could probably be built and maintained at lesser cost than the best conventional systems which require great quantities of radiating wires supported aloft by many intermediate height towers emplaced over large expanses of ground. Much detailed study would have to be performed to define and elucidate the structural, erection, and economic factors relating to any specific 3000-ft high tower structure intended for a particular site. (Author)

AD-285 068 Div. 8, 26
(TISTE/CRJ) OTS price $8.60

RCA Defehse Electronic Products, Camden, N. J.
MICRO-MODULE PRODUCTION PROGRAM.
Quarterly rept. no. 17, 1 Apr-1 July 62.
1 July 62, 1v. incl. illus. tables.
(Contract DA 36-039-sc-75968)
Unclassified report

DESCRIPTORS: *Microminiaturization (Electronics), *Manufacturing methods, Ceramic capacitors, Variable capacitors, Electrolytic capacitors, Resistors, Capacitors, Radiofrequency coils, Semiconductors, Transistors, Diodes, Crystals, Reliability, Communication equipment, Digital computers, Packaging, Packaged circuits, Production, Life expectancy, Processing, Cermets, Pulse transformers, Encapsulation, Computer logic, Radio receivers, Radio transmitters, Electronic circuits.

Efforts continued on the design and construction of micro-modular electronic circuits which will equip the US Army with a broad new production potential for the construction of microminiature electronic equipment. Research is presented on the following: capacitors, resistors, inductors, semiconductor devices-transistors and diodes, crystals, micro-module reliability, communication equipment (AN/PRC-51), and the Micropac computer system.

AD-285 072 Div. 8, 25
(TISTIP/JW) OTS price $4.60

Stanford U., Calif.
THE TRANSIENT RESPONSE OF GAS TURBINE PLANT HEAT EXCHANGERS. ADDITIONAL SOLUTIONS FOR REGENERATORS OF THE PERIODIC-FLOW AND DIRECT-TRANSFER TYPES,
by A. L. London, D. F. Sampsell and Jon G. McGowan. 15 July 62, 31p. incl. illus. table.
(Technical rept. no. 53)
(Contract Nonr-22523, Proj. NR 090-342)
Unclassified report

DESCRIPTORS: *Gas generating systems, *Heat exchangers, Gas turbines, Fluid flow, Heat transfer, Boundary layer, Thermal conductivity, Differential equations.

Solutions are provided in nondimensional graphical form for the transient response of the outlet fluid temperatures of a counterflow gas turbine regenerator arising from a step input change of one (either one) of the inlet fluid temperatures. Both direct-transfer and periodic-flow regenerators are considered. The periodic-flow regenerator solutions are derived as a generalized result from a limited number of computer solutions for special cases. The direct-transfer regenerator solutions are derived as a generalized result from a limited number of special case solutions obtained from an electromechanical analog. (Author)

AD-285 073 Div. 8, 25
(TISTP/JW) OTS price $10.10

Stanford U., Calif.
THREE FLUID HEAT EXCHANGER DESIGN THEORY COUNTER- AND PARALLEL-FLOW,
by Tor Sorlie. Aug 62, 111p. incl. illus. tables (Technical rept. no. 54)
(Contract Nonr-22523, Proj. NR 090-342)
Unclassified report

DESCRIPTORS: *Heat exchangers, *Fluid flow, Boundary layer, Temperature, Design, Heat transfer.

A design theory for two flow arrangements of three-fluid heat exchangers has been developed. The dependent performance of the heat exchanger has been expressed in terms of two dimensionless quantities, termed temperature effectivenesses. The temperature effectivenesses are expressed as functions of five independent dimensionless exchanger variables, three representing operating conditions and two design conditions. This situation contrasts with one dependent and two independent dimensionless parameters for the two-fluid exchanger, a very much less complex problem. Graphs are presented showing functions of the five exchanger variables. The practical application of the design theory is shown in three examples. Insight into the problems arising in designing three-fluid heat exchangers can be achieved by inspection of the temperature effectiveness curves. (Author)

AD-285 106 Div. 8, 26, 14, 17
(TISTE/CRJ) OTS price $3.60

Sperry Gyroscope Co., Great Neck, N. Y.
CERAMIC-METAL SEALS FOR HIGH-POWER TUBES.
Technical note no. 4, 6 Mar-12 June 62,
by C. Johnson, I. Waraska, and E. Cheatham.
June 62, 25p. incl. illus. tables (Rept. NA-8250-8268-4)
(Contract AF 30(602)2371, Proj. 5573)
(RADC TDR 62-368) Unclassified report

DESCRIPTORS: *Electron tubes, *Metal seals, Ceramic materials, Metals, Tensile properties, Sintering, Brazing, Processing, Life expectancy, Chemical milling, Ionization gages, Tests, Manufacturing methods.

Study was continued on ceramic-to-metal seals for high-power tubes. Test results were recorded for 1425 C, 1500 C, and 1575 C sintering and for 4-, 6-, and 8-hour temperature cycles. There does not appear to be a systematic increase in averages with an increase in temperature, nor does any temperature cycle show definitive results. Investigations are in progress to correlate eccentricity of the halves of test samples with changes in tensile strength. A modified nonpumping ion gage was designed which is expected to eliminate sputtering. Sixty ceramic-to-metal assemblies of a typical window design were made, with a yield of 83% being vacuum-tight. The leakers are undergoing analysis. (Author)

AD-285 110 Div. 8, 6
(TISTE/CAM) OTS price $1.60

Tucor, Inc., Wilton, Conn.
RESEARCH AND DEVELOPMENT WORK ON L-BAND BEAM TYPE SWITCH FOR MARK XII IFF SYSTEMS.
Quarterly progress rept. no. 4, 1 Feb-1 May 62,
by T. Dowling and L. Dombro. 1 May 62, 17p. incl. illus.
(Contract DA 36-039-sc-87220, Proj. 3G 19-03-001)
Unclassified report

DESCRIPTORS: *Electron tubes, *Beam power tubes, L band, Coupling circuits, Effectiveness, Electron guns, Focusing, Impedance matching, Identification systems, Radar equipment, Theory, Design, Switching circuits.

The research and development program investigating the general properties of beam-type switching devices of the beacotron variety was continued. A total of 22 tubes were completed and brought through various stages of processing and testing. Five of these tubes were rf tested with the majority of the remainder analyzed under low voltage DC or high voltage pulsed conditions. The basic electrical and mechanical design of the gridded Pierce gun and the couplers were proven to be satisfactory for proper performance of the device. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-285 118 Div. 8
(TISTE/CAM) OTS price $2.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
VOLTAGE BREAKDOWN OF AN L-BAND BEACON ANTENNA,
by H. Burt Hiester. May 62, 25p. incl. illus. tables, 5 refs. (ASRDL Technical rept. no. 2288)
(DA Proj. 3A99-23-001-01)
Unclassified report

DESCRIPTORS: *Guided missile antennas, *Radiofrequency power, *Conical antennas, *Radio beacons, Dipole antennas, L band, Electrons, Ionization, Dielectrics, Absorption, Altitude chambers, Air, Pressure, Simulation, Standing wave ratios, Radio signals, Radio reception, Test equipment, Test methods, Camphors, Theory.

In an investigation of antenna radio-frequency breakdown, two beacons differing in output power levels and pulse repetition rates were used in separate tests to supply RF signals to an L-band antenna. The antenna, mounted on a three-foot missile section, was located in a vacuum chamber where high altitudes could be simulated by reducing the air pressure. The receiving antenna, a corner-reflector dipole, was connected to a spectrum analyzer used as a receiver. Concurrently, studies were made to ascertain the effectiveness of camphor as a breakdown retarding agent and of an ultraviolet source as a stabilizing agent. Of three methods used to determine the pressure at which antenna breakdown would occur, received signal provided the best single indication. Antenna breakdown is essentially an ionization process which is accompanied by reduced amplitude of the received signal. Test results showed that the greater the peak power, the higher the pressure at which breakdown begins; and the more complete the ionization, the greater the reduction in received signal. (Author)

AD-285 141 Div. 8
(TISTE/CAM) OTS price $1.10

Watkins-Johnson Co., Palo Alto, Calif.
APPLIED RESEARCH ON A HIGH-POWER MILLIMETER-WAVE GENERATOR.
Interim engineering rept. no. 5, 1 June-31 Aug 62,
by James W. Sedin. 31 Aug 62, 5p.
(Contract AF 33(616)8369)
Unclassified report

DESCRIPTORS: *Backward wave oscillators, *Radiofrequency generators, *Electron tubes, Microwave networks, Extremely high frequency, Radiofrequency power, Voltage, Electron guns, Magnetic fields, Focusing, Electron beams, Waveguides, Design, Measurement, Carbides, Silicon compounds, Electroforming, Tests.

Experimental tube No. 1 was repaired and additional testing was carried out. Oscillations were observed from 94.2 to 101.3 Kmc. A calorimeter was used to check peak RF power measurements made previously with a calibrated crystal. Agreement was reasonably good and peak powers of the order of 50-100 kw were observed. An average power of 50 watts was measured at 99 Kmc. About 8 kw of average beam power was passed through the circuit before it was destroyed. A new gun is being designed that will result in more RF output power and lower magnetic focusing field. Silicon carbide waveguide loads are being tested to replace the sprayed stainless steel loads. (Author)

AD-285 159 Div. 8
(TISTE/CRJ) OTS price $8.10

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
ELECTROLUMINESCENT DISPLAY TECHNIQUES.
Final rept. for 15 Mar 61-15 Mar 62 on Applied Communication Research for Air Force Vehicles,
by M. S. Wasserman, S. Talesnick and S. Yando.
June 62, 78p. incl. illus. 5 refs.
(Contract AF 33(616)8065, Proj. 4335)
(ASD TDR 62-586) Unclassified report

DESCRIPTORS: *Display systems, *Luminescent materials, Piezoelectric materials, Photoelectric materials, Photoconductivity, Electrodes, Luminescence, Phosphorescence, Phosphorescent materials, Transducers, Electronic circuits, Solid state physics, Life expectancy, Reliability, Semiconductors, Data storage systems, Phosphors, Oscilloscopes, Electric fields, Coding, Airborne.

The development of two solid-state electroluminescent (EL) display devices is described. The first is a compact, alphanumeric message display using EL display characters and photoconductive-electroluminescent (PC-EL) circuits to translate 6-bit binary input information to the display code, to gate the information to the selected characters and to store the displayed information on each character. Construction of a feasibility model that displays ten 3/8-inch-high characters in a line 3-3/4 inches long is described. The second combines unique properties of piezoelectric and electroluminescent materials. The basic panel requires only four properly timed electrical inputs to produce a spot of light. Operating principles are discussed. The construction of an improved display panel using special input transducers for higher brightness and employing a solid-state drive system for producing oscilloscope patterns is described. (Author)

AD-285 169 Div. 8, 15
(TISTP/WH) OTS price $5.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE ANALYTIC FOUNDATIONS OF LINEAR, TIME-INVARIANT N-PORTS, PART I,
by D. C. Youla, L. Kaplan, and D. Stock.
3 May 62, 47p. illus. 12 refs. (Rept. no. PIBMRI-1028-62)
(Contract AF 19(604)4143; In cooperation with New York U. Coll. of Engineering, Contract AF 19(604) 7486, Proj. 5635)
(AFCRL 62-393) Unclassified report

DESCRIPTORS: *Electrical networks, *Circuits, *Matrix algebra.

At a single frequency, a linear, source-free, time invariant n-port N is completely characterized by the n x n normalized scattering matrix S. The work of Mason, Deschamps, and Schaug-Petterson and Tonning, has revealed the very striking connection between the basic performance properties of 2-ports and their invariants under lossless reciprocal embeddings leaving the number of ports unchanged. In general, the embedding of an n-port N in a 2n-port M results in a new n-port N whose scattering matrix W is a matrix bilinear transform of S. One main objective is to show that lossless, reciprocal M induces transformations that are strict analogues of those Mobius mappings of the ordinary complex plane which leave the unit circle invariant. The observation serves as the starting point for almost all the investigations reported herein. (Author)

AD-285 193 Div. 8, 5
(TISTE/CRJ) OTS price $5.60

RCA Defense Electronic Products, Camden, N. J.
A SOLID-STATE INTERMEDIATE POWER AMPLIFIER FOR PROPOSED RADIO RELAY SYSTEM AN/GRC-103.
Final rept. on Task 2B,
by S. Kallus and A. Newton. 15 Sep 62, 29p. illus. tables, 4 refs. (Rept. no. CR-62-419-7)
(Contract DA 36-039-sc-87240)
Unclassified report

DESCRIPTORS: *Transistor amplifiers, *Frequency multipliers, *Power amplifiers, *Radio transmitters, *Radio relay systems, *Microwave relay systems, Very high frequency, Ultra high frequency, Tuned amplifiers, Radio frequency amplifiers, Semiconductors, Transistors, Diodes, Impedance, Electronic circuits, Radiofrequency power, Sources.

The development is presented of a solid-state UHF power amplifier capable of delivering RF power output of two watts to the final stage of the AN/GRC-103 transmitter, covering the range of 220 mc - 700 mc. The circuit used comprised both a transistor driver operating in the 87.5 - 175 mc range and varactor multipliers. A double was used for the 220 - 350 mc band, and a quadrupler for the 350 - 700 mc band. The goal of two watts power output is achieved in the lower band with a double efficiency of better than 50%. The quadrupler efficiency is 25%, but the required drive power of 8 watts for a 2-watt output could not be developed at 175 mc using available transistors. Coupling networks were individually tuned for maximum over-all efficiency. (Author)

AD-285 194 Div. 8
(TISTE/CAM) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
TUNNEL CATHODES FOR MICROWAVE TUBES.
Interim rept. no. 1, 1 June-31 Aug 62,
by D. V. Geppert. Sep 62, 12p. incl. illus.
(Contract AF 33(657)8721, Proj. 4125)
Unclassified report

DESCRIPTORS: *Cathodes (Electron tubes), *Cold cathode tubes, Electron tubes, Thermionic emission, Metal films, Electrons, Attenuation, Effectiveness, Reliability, Life expectancy, Pulse modulation, Niobium compounds, Oxides, Thin films, Cadmium compounds, Sulfides.

Experiments with anodized niobium are described. The results obtained with different metal counter-electrodes are discussed. The barrier shape is computed and evaluated. Vacuum emission experiments with anodized niobium are described. The usefulness of cadmium sulfide for the insulator film is discussed. Experiments with painted and sprayed films are described. Vacuum emission tests with gold--cadmium sulfide--gold cathodes are discussed. The theoretical analysis of hot electrons in metals is briefly discussed. Plans for future work are described. (Author)

AD-285 210 Div. 8
(TISTE/CAM) OTS price $3.00

Syracuse U. Coll. of Engineering, N. Y.
THEORETICAL AND EXPERIMENTAL STUDIES RELATING TO MECHANISMS OF FAILURE OF SEMICONDUCTOR DEVICES.
Final rept.,
by W. Howard Card, Rajendra P. Nanavati and others. 21 May 62, 158p. incl. illus. tables, refs. (Rept. no. EE 751-625TN-3; Technical rept. no. 3)
(Contract AF 30(602)2177)
(RADC TDR 62-271) Unclassified report

DESCRIPTORS: *Semiconductors, *Transistors, *Diodes, Failure (Mechanics), Life expectancy, Deterioration, Reliability, Noise (Radio), Measurement, Mathematical analysis, Statistical functions, Surface properties, Electric fields, Voltage, Electrical properties, Electronic equipment, Design, Manufacturing method, Processing, Germanium, Gallium compounds, Arsenides, Test methods.

Various aspects of semiconductor device theory were studied to arrive at a better understanding of the physical processes involved in the degradation and failure of such devices. Low frequency noise was investigated and mathematical models for 1/f noise were developed for power spectral density functions and correlation functions. Considerations relating to relative ease of developing measurement techniques of power spectral density functions and correlation functions are discussed. Zener breakdown and avalanche breakdown phenomena in p-n junctions were investigated analytically and experimentally at localized points of breakdown referred to as microplasmas. A theory of failure was postulated for gallium arsenide tunnel diodes. A theoretical model of a semiconductor surface is developed and a number of measurements made which are intended to correlate with this model. These involve potential measurements on floating electrodes, reverse current drift measurements, field effect measurements, and mechanical stress application and measurements. (Author)

AD-285 219 Div. 8
(TISTE/CAM) OTS price $9.10

ARINC Research Corp., Washington, D. C.
RELIABILITY AND APPLICATION DATA FOR COMPONENTS USED IN MISSILE ELECTRONIC SYSTEMS.
Final rept.,
by W. B. Reese. 31 July 62, 99p. incl. illus. tables, 12 refs. (Pub. no. 188-2-311)
(Contract NOw 61-0982-c)
Unclassified report

DESCRIPTORS: *Carbon resistors, *Diodes, *Electrolytic capacitors, *Tantalum capacitors, *Electronic systems, Reliability, Capacitors, Silicon, Electrical properties, Test methods, High temperature research, Low temperature research, Shock, Humidity, Vibration, Life expectancy, Experimental data, Metal films, Electronic equipment, Guided missiles.

Contents:
Carbon-film and metal-film resistors
Silicon voltage-regulator diodes
Silicon switching diodes
Tantalum electrolytic capacitors
Metalized mylar capacitors

AD-285 223 Div. 8
(TISTE/CAM) OTS price $12.00

Airborne Instruments Lab., Inc., Deer Park, Long Island, N. Y.
INTERFERENCE ANALYSIS OF NEW COMPONENTS AND CIRCUIT TECHNIQUES, VOLUME I.
Final rept.,
by S. Becker, J. A. Aichroth and others. May 62, 1v. incl. illus. tables (Rept. no. 8899-1)
(Contract AF 30(602)2384, Proj. 4540)
(RADC TDR 62-221, vol. 1)
Unclassified report

DESCRIPTORS: *Solid state physics, *Masers, *Parametric amplifiers, *Diodes, *Noise (Radio), Circuits, Interference, Radio interference, Impedance matching, Frequency stabilizers, Temperature, Measurement, Oscillators, Radioactivity, Amplifiers, Feedback, Band pass filters, Modulation.

The theoretical analyses are developed which are necessary to provide an understanding of the nonlinear behavior and spurious responses of several solid-state components and devices. These include masers, parametric amplifiers, transistors, tunnel diodes, and ferrite devices. The extent of interference effects in particular circuit applications are estimated. The effects are desensitization, cross modulation, intermodulation, spurious responses, gain stability, and gain recovery time. These effects are treated taking into account the inherent device characteristics, impedance matching, selectivity, automatic gain control, automatic frequency control, and temperature variation. Experimental data show the degree of agreement with predictions of the interference effects. In the absence of predictable interference effects, the data obtained provide empirically derived bases for predictions. This document is composed of two volumes; Volume II is AD 285 224. (Author)

AD-285 224 Div. 8
(TISTE/CAM) OTS price $14.00

Airborne Instruments Lab., Inc., Deer Park, Long Island, N. Y.
INTERFERENCE ANALYSIS OF NEW COMPONENTS AND CIRCUIT TECHNIQUES. VOLUME II.
Final rept.,
by S. Becker, J. W. Aichroth and others.
May 62, 1v. incl. illus. tables, 55 refs.
(Rept. no. 8899-1, vol. 2)
(Contract AF 30(602)2384, Proj. 4540)
(RADC TDR 62-221, vol. 2)
Unclassified report

DESCRIPTORS: *Transistors, *Ferrites, *Crystal mixers, *Noise (Radio), Diodes, Radio interference, Crystal mixers, Limiters, Modulation, Amplifiers, Radiofrequency filters, Band pass filters, Waveguide filters, Feedback, Measurements, Temperature, Electric switches, Magnetic fields, Phase shifters, Radiofrequency attenuators, Video amplifiers, Band pass amplifiers, Radiofrequency amplifiers, Transmission lines.

AD-285 256 Div. 8
(TISTE/CAM) OTS price $1.60

ITT Industrial Labs., Fort Wayne, Ind.
RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IATRON DIRECT VIEW STORAGE TUBES.
Interim development rept. 23 Mar-22 Aug 62,
by R. H. Clayton and P. A. Lilie. 4 Oct 62,
16p. incl. illus. (Serial no. 3227)
(Contract NObsr-87264)
Unclassified report

DESCRIPTORS: *Storage tubes, *Cathode ray tubes, *Image converter tubes, Electron lenses, Electromagnetic lenses, Simulation, Model tests, Electrons, Focusing, Steel, Disks, Ceramic materials, Electric insulation, Storage, Surfaces, Measurement, Design, Electron tubes.

A magnetically focused and deflected Iatron tube was built. The tube was designed around a write gun whose beam velocity was chosen to match the peak secondary emission potential of magnesium fluoride, 800 volts. Scan section length was chosen at 10 inches. Focus coil flux density was chosen to provide four or five loops of focus in the scan section. Image section length is 4 inches. Equipment for the operation of the magnetic Iatron was assembled and preliminary testing was performed. (Author)

AD-285 292 Div. 8, 26
(TISTE/CAM) OTS price $1.60

Lansdale Div., Philco Corp., Pa.
PEN FOR ELECTROCHEMICALLY ETCHED TRANSISTORS 2N495 AND 2N496.
Quarterly progress rept. no. 5, 19 May-19 Aug 62,
by D. Weisel and D. Schmechel. 19 Aug 62,
9p. incl. illus. (Rept. no. R-230.1)
(Contract DA 36-039-sc-85959)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Industrial production, Industrial equipment, Production, Machines, Design.

Effort continued on the production engineering measure for specific processes applicable to electrochemically etched transistors. The mechanical and electrical design of the SAT Whisker Attacher is complete. All subassemblies were assembled and mounted to the main body and drive system. The complete electrical control system, together with the mechanical assembly, is mounted to the base weldment which houses the drive motor and the electrical cams. Wiring of the electrical control unit to the terminal board in the base weldment is complete. Machine wiring and mechanical set-up and debugging is in progress. (Author)

AD-285 305 Div. 8, 14
(TISTE/CRJ) OTS price $11.00

Sprague Electric Co., North Adams, Mass.
DEVELOPMENT CONTRACT. HIGH TEMPERATURE PULSE FORMING NETWORK.
Final development rept., 29 May 59-30 July 62,
by R. Lord, G. Adams, and J. Butner. 30 July 62,
133p. incl. illus. tables (Serial no. 27)
(Contract NObsr-77598)
Unclassified report

DESCRIPTORS: *Modulators, *Radar equipment, *Pulse generators, *Waveform generators, *Electrical networks, High temperature research, Materials, Capacitors, Polymers, Fluorocarbons, Solubility, Sulfur compounds, Fluorides, Physical properties, Dielectric properties, Electrical properties, Hydrogen, Reduction.

The development is presented of a high temperature pulse forming network for use in radar modulators. The investigation was concerned with: (1) various characteristics of impregnants and insulating materials from which a pulse forming network could be constructed; (2) design techniques utilizing the characteristics of new materials selected as result of testing; (3) constructing models using the selected materials and testing these models under the applicable specifications to determine parameters for the final design; (4) constructed and tested units in compliance with the specification. The design met all electrical requirements but exhibited a partial failure under environmental conditions (vibration). Recommendations for correction of the design are given. (Author)

AD-285 317 Div. 8
(TISTE/CRJ) OTS price $1.60

Westinghouse Electric Corp., Baltimore, Md.
PHOTOGENERATOR POWER CONVERSION STUDY.
Interim rept. no. 3, June-Aug 62,
by I. Limansky, E. F. Wood, and A. S. Jensen.
1962, 17p. incl. illus. table.
(Contract AF 33(657)7865)
Unclassified report

DESCRIPTORS: *Phototubes, *Solar cells, *Generators, Power transformers, Anodes (Electron tubes), Cathodes (Electron tubes), Glass, Seals, Indium, Indium alloys, Silver alloys, Vacuum systems, Vacuum seals, Photosensitivity, Processing.

investigation concerns ways and means of constructing developmental models of a close-spaced thin, solar power converter using the photoemissive principle. The processing system was completed. Minor changes were made in fabrication techniques. Electrical tests were made on a converter delivered by W Astroelectronics. (Author)

AD-285 367 Div. 8, 14
(TISTM ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - ATTACHMENTS - SOLID LAMINATE RADOMES, EVALUATION OF,
by F. DeLeon, Jr. 22 Mar 60, 17p. incl. illus. tables (Rept. no. FGT-2434, sec. 5)
(Contracts AF 33(600)36200 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Radomes, *Laminated glass, Doppler radar, Search radar, Laminates, Plastics, Reinforcing materials, Mechanical properties, Manufacturing methods, Titanium, Aluminum, Thickness, Failure (Mechanics), Stresses, Materials, Physical properties.

Specimens to simulate doppler radome construction were prepared. Specimens consisted of glass core and glass reinforced plastic laminate skins with Al or Ti bearing plates (.25 in or 188 in thickness) bonded in place with FM-99 adhesive during fabrication. Specimens were tested at -67, 75 and 300 F after 30 min. and 100 hours at 300 F for ultimate load and bearing stress. Generally the specimens aged 100 hours at 300 F gave higher results than the unaged specimens. The bearing inserts .188 in thick made of Al gave better results than similar inserts made of Ti while .25 in thick Al bearing inserts yielded higher elevated temperature results but lower R.T. and -67 F results than those of Ti. The bearing inserts .25 in thick of both Al and Ti showed higher ultimate loads but lower bearing stresses than the .188 in thick insert specimens. (Author)

AD-285 373 Div. 8, 14
(TISTM ODN) OTS price $2.60

General Dynamics/Fort Worth, Tex.
MATERIAL - SCREENING SOLID LAMINATE - RADOMES - EVALUATION OF,
by J. R. Peoples, Jr. 24 Nov 59, 22p. incl. tables (Rept. no. FGT-2434, sec. 1)
(Contracts AF 33(600)36200 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Radomes, *Epoxy resins, *Laminates, Physical properties, Electrical properties, Elasticity, Dielectric properties, Stresses, Esters, Polymers, Resins, Density, Thickness, Structures, Aging, Tests, Manufacturing methods.

Four resins were used in the fabrication of laminates. Epon 828 and Dow Epoxy Resin 332, both being epoxy resins, were compared to each other as were two modified polyester resins, Laminac 4232 and Vibrin 136A. Laminates were made from each resin incorporating several variables including three fabric finishes, three cure cycles, three curing agents, three curing agent concentrations, and three finished laminate resin content ranges. The variables were selected which produced the best laminate, structurally and electrically, from each resin. The Epon 828 laminate-system possessing the most desirable combination of structural strengths and electrical properties was compared to the best D E.R. 332 laminate so as to select the epoxy laminate system to be further evaluated. A comparison between the optimum Laminac 4232 laminate and the most desirable Vibrin 136A laminate produced the modified polyester system that was to be further evaluated. (Author)

AD-285 380 Div. 8
(TISTE/CAM) OTS price $3.60

Hughes Research Labs., Malibu, Calif.
FEASIBILITY OF A MESHLESS STORAGE TUBE.
Interim scientific rept. no. 2, 15 May-14 Sep 62, by N. H. Lehrer. 14 Sep 62, 27p. incl. illus. tables, 2 refs.
(Contract AF 33(657)7789)
Unclassified report

DESCRIPTORS: *Storage tubes, Conductivity, Cadmium compounds, Sulfides, Selenides, Sodium compounds, Chlorides, Materials, Electron beams, Dielectric films, Electric fields, Zinc compounds, Indium, Electrodes, Photoconductivity, Chemical impurities, Tests, Feasibility studies.

Effort continued to conduct a systematic study of BIC materials which can be used to demonstrate the feasibility of a meshless storage tube. Emphasis was on the search for a material with the appropriate sustained BIC properties. The search was primarily an experimental one because of the absence of any substantive theory of sustained BIC to serve as a guide. The problem was attacked from three directions; a study of the effect of impurities on BIC in zinc sulfide, a study of the effect of electrode contacts on BIC in zinc sulfide, using electrodes with low work functions and those with barrier (oxide) layers, and a study of BIC in cadmium sulfide. (Author)

AD-285 386 Div. 8
(TISTP/MS) OTS price $3.60

Norwegian Defence Research Establishment.
INVESTIGATION OF A PERIODIC TRANSMISSION LINE FOR USE AS A TRANSVERSE-WAVE COUPLER,
by Jon Sorland. 16 Feb 62, 35p. incl. illus. 5 refs. (Technical note no. 3)
(Contract AF 61(052)531)
(RADC TDR 62-201) Unclassified report

DESCRIPTORS: *Coupling circuits, *Amplifiers, *Transmission lines, Electron beams, Electronic equipment, Frequency, Measurement, Microwaves, Low frequency.

The paper describes an investigation of a periodic transmission line intended for use as a coupler in a transverse-field electron beam device. The field distribution, interaction impedance and phase diagram are calculated. A line operating at 1000 Mc/s is constructed and its properties are measured. Despite a favourable interaction impedance the line is not well suited as coupler at low frequencies (1000 Mc/s) since large mechanical dimensions are required in order to obtain low phase velocity. However, the line may be used as coupler at higher frequencies. (Author)

AD-285 387 Div. 8
(TISTE/CRJ) OTS price $5.60

Norwegian Defence Research Establishment.
MINIMUM NOISE TEMPERATURE OF DC-PUMPED TRANSVERSE-WAVE ELECTRON BEAM AMPLIFIERS,
by Tore Wessel-Berg and Kjell Blotekjaer. 30 May 62, 45p. illus. 35 refs. (Technical note no. 6)
(Contract AF 61(052)531)
(RADC TDR 62-451) Unclassified report

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

DESCRIPTORS: *Amplifiers, *Radiofrequency amplifiers, *Noise (Radio), Direct current, Cyclotrons, Cathodes (Electron tubes), Traveling wave tubes, Klystrons, Mathematical analysis, Matrix algebra, Magnetic fields, Electric fields, Transformations (Mathematics), Theory.

A general analysis is presented of noise in dc-pumped amplifiers based on transverse waves. It is shown that any amplifier involving either the cyclotron waves or the synchronous waves has the same minimum noise temperature determined by the conditions at the cathode. The noise temperature can be reduced to an arbitrary small value by increasing the magnetic field at the cathode or by reducing the cathode diameter. It is also shown that the minimum noise temperature is reduced by the smoothing effect of the potential minimum near the cathode. The minimum noise, temperature can be realized by inserting a suitable noise transformer between the cathode and the amplifier. In general, structures with electric or magnetic fields having rotational symmetry such as used in normal electron guns can perform the required transformation. Some specific examples of noise transformers are discussed. (Author)

AD-285 422 Div. 8, 26
(TISTE/CAM) OTS price $3.60

Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURES. HIGH FREQUENCY TRANSISTOR.
Quarterly progress rept. no. 4, 20 Mar-20 June 62, by T. G. Stoudt. 20 June 62, 32p. incl. illus. table.
(Contract DA 36-039-sc-85969)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Ultrahigh frequency, Design, Germanium, Diffusion, Evaporation, Electrical properties, Processing, Tests, Experimental data, Production.

Effort continued to establish a production design of a 1000 mc germanium transistor. Engineering effort was devoted to developing improvements in epitaxial substrate material, development of techniques to diffuse the epitaxial material, continued development of assembly processes, and development of test fixtures for high frequency measurements. (Author)

AD-285 423 Div. 8
(TISTE/CRJ) OTS price $1.10

Westinghouse Electric Corp., Baltimore, Md.
ELECTROLUMINESCENT FERROELECTRIC (ELF) SOLID STATE DISPLAY.
Quarterly interim development rept. no. 17, 1 June-31 Aug 62.
31 Aug 62, 7p. incl. illus. tables.
(Contract NObsr-72782)
Unclassified report

DESCRIPTORS: *Display systems, *Solid state physics, Luminescent materials, Ferroelectric materials, Data storage systems, Life expectancy, Electronic switches, Ionic current, Electrostriction.

Contents:
Material research
Ionic switches
Electrostrictive switches
Ceralectric cells
6 x 64 Model
4 x 4-in. Experimental model
Screen fabrication procedure
Initial evaluation

AD-285 428 Div. 8
(TISTE/CAM) OTS price $16.50

Bureau of Naval Weapons, Navy Dept., Washington, D. C.
PROCEEDINGS SYNCHRO DESIGN AND TESTING SYMPOSIUM, 17 AND 18 MARCH 1960 HELD AT THE DEPARTMENT OF COMMERCE AUDITORIUM.
18 Mar 60, 1v. incl. illus. tables, refs.
Unclassified report

DESCRIPTORS: *Synchros, *Symposia, Shock, Vibration, Dielectrics, Analog computers, Digital computers, Heat transfer, Voltage, Airborne, Standards, Design, Test equipment, Solid state physics, Generators, Hall effect, Instrumentation, Errors, Mathematical analysis, Materials.

Contents:
Synchro Shock and vibration testing in accordance with MIL-S-20708
Predicting surface temperature of synchros in sealed containers
Evaluation of synchro applications using equivalent T-network
Synchro devices for performance of mathematical functions
Synchro applications in airborne computers
Some problems in the standardization and design of synchros
Advance development in the design of synchros
Design of stainless steel clad plastic encapsulated size 23XN synchro
An outline of present and prospective British services' application standardized synchros
Resolver-amplifier design requirements
Solid state function generators and the Hall Effect
Electrical two-speed synchro system
Tolerancing of synchro parameters
Development of test instruments for synchros
Synchro design limitations in system applications
Equations useful in evaluation of synchros
Analysis of basic synchro angular errors
Standardization of synchros
British synchro testing, equipment, and methods

AD-285 431 Div. 8
(TISTP/TL) OTS price $6.60

Maryland U., College Park.
EFFECTS OF PARAMETER VARIATIONS ON THE RESPONSES OF A TYPE-1 POSITIONING SERVOMECHANISM WITH NONLINEAR FRICTION AND VARIED STEP VELOCITY INPUTS.
Master's thesis,
by Albert Webster Small. 1962, 1v. incl. illus. 6 refs.
Unclassified report

DESCRIPTORS: *Servomechanisms, *Control systems, Damping, Velocity, Torque, Oscillation, Damping, Statics, Rotation, Friction.

A type-1 positioning servomechanism with rotational inertia, viscous damping, coulomb friction and stiction will operate in one of several possible steady states. Which one, depends upon magnitude of angular input velocity, and method used to reach that magnitude. (Author)

AD-285 465 Div. 8
(TISTE/CAM) OTS price $1.60

Norwegian Defence Research Establishment.
AN UNEXPECTED EFFECT IN AN EXPERIMENTAL TRANSVERSE-WAVE TUBE,
by Kjell Blotekjae, Bjarne Malsnes, and Agne Nordbotten. 7 May 62, 13p. incl. illus. tables, 3 refs. (Technical note no. 5)
(Contract AF 61(052)531)
(RADC TDR 62-450) Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Microwave amplifiers, Electron tubes, Electron guns, Cathodes (Electron tubes), Magnetic fields, Electron beams, Model tests, Coupling circuits, Voltage, Electric currents, Design, Theory, Equations, Cyclotrons.

In a tube consisting of two Cuccia-couplers separated by a long metallic drift-tube, gain in excess of 30 db was observed. It was shown theoretically that the gain can be explained by a quadrupole pump field established in the drift-tube by the beam itself, provided the dc-beam performs a spiralling motion close to the wall of the drift-tube. This is verified experimentally. (Author)

AD-285 466 Div. 8
(TISTP/WH) OTS price $1.60

Norwegian Defence Research Establishment.
TRANSVERSE WAVE INTERACTION IN ELECTRON BEAM DEVICES.
Final technical rept.,
by K. Blotekjaer, B. Malsnes, and A. Nordbotten.
July 62, 10p. incl. tables, 11 refs. (Rept. no. R-122)
(Contract AF 61(052)531)
(RADC TDR 62-453) Unclassified report

DESCRIPTORS: *Parametric amplifiers, *Electron guns, *Cyclotrons, *Electron guns.

The interaction of transverse electron beam waves with external electromagnetic fields, and the application of this interaction in microwave devices are discussed. In particular, problems involving various aspects of the so-called DC-pumped electron beam amplifiers were analysed. Interaction problems in the pump field were analysed both theoretically and experimentally. Considerable attention was devoted to problems of noise theory, and an expression for the minimum noise temperature of DC-pumped amplifiers was derived. Research on the problem of designing suitable periodic structures for the input- and output-couplers of transverse field devices was performed. The theory of a harmonic generator based on cyclotron waves was presented. Three tubes were designed and tested. Two of them were cyclotron-wave amplifiers, and the third a synchronous-wave amplifier. They all worked in satisfactory agreement with theory. (Author)

AD-285 467 Div. 8
(TISTP/WH) OTS price $4.60

Norwegian Defence Research Establishment.
AN EXPERIMENTAL SYNCHRONOUS-WAVE AMPLIFIER,
by Agne Nordbotten. 8 June 62, 39p. incl. illus. 9 refs. (Technical note no. 7)
(Contract AF 61(052)531)
(RADC TDR 62-455) Unclassified report

DESCRIPTORS: *Parametric amplifiers, *Electron guns, *Cyclotrons, *Electron beams, Differential equations, Complex numbers.

This analysis is concerned with the amplification of the synchronous waves in an electrostatic quadrupole pump field. Abrupt reversals of the magnetic field between the pump and the input- and output-couplers make it possible to use Cuccia-couplers coupling to the fast cyclotron wave. The small-signal gain was calculated under the assumption of a filamentary electron beam. An experimental tube was built, and measurements of gain and bandwidth performed. A maximum gain of 16 db was observed. (Author)

AD-285 468 Div. 8
(TISTE/CAM) OTS price $2.60

Norwegian Defence Research Establishment.
A DC-PUMPED AMPLIFIER USING SPACE-PERIODIC MAGNETIC FIELD,
by T. Wessel-Berg and Kjell Blotekjaer.
28 June 62, 16p. illus. 8 refs. (Technical note no. 9)
(Contract AF 61(052)531)
(RADC TDR 62-456) Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Microwave amplifiers, Direct current, Electron tubes, Cathodes (Electron tubes), Electron guns, Electron beams, Focusing, Magnetic fields, Cyclotrons, Coupling circuits, Measurements, Design, Theory, Model tests, Equations.

Described is an experimental amplifier based on coupling between cyclotron and synchronous waves in a periodic magnetostatic field. Beam expansion, which represents a major obstacle in synchronous-wave amplifiers, is overcome by means of a new focusing scheme. The tube was operated at 730 mc with electronic gain of 8.6 db. (Author)

AD-285 469 Div. 8
(TISTP/WH) OTS price $2.60

Norwegian Defence Research Establishment.
A THEORETICAL ANALYSIS OF THE NOISE PERFORMANCE IN PARAMETRIC CYCLOTRON-WAVE AMPLIFIERS,
by Erling Sunde. 2 July 62, 26p. incl. table, 7 refs. (Technical note no. 10)
(Contract AF 61(052)531)
(RADC TDR 62-486)
Unclassified report

DESCRIPTORS: *Parametric amplifiers, *Noise (Radio), *Electron guns, *Cyclotrons, *Electron beams, Partial differential equations, Simultaneous equations.

The calculation of noise in a parametric cyclotron-wave amplifier of the quadrupole type is presented. The analysis is correct to second order in the pump amplitude. The calculated noise temperature of the amplifier consists of two terms, the first being proportional to the cathode temperature, and the second proportional factor gamma squared where gamma squared is the space-charge smoothing factor accounting for the smoothing of position noise taking place at the potential minimum in front of the cathode. It is shown, by design parameters for three different tubes, that the noise temperature of the parametric quadrupole amplifier seems to increase rapidly with frequency. The noise temperature is also shown to be proportional to the pump power. (Author)

AD-285 491 Div. 8
(TISTE/CAM) OTS price $4.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOVIET BOOKS ON RADIOTECHNOLOGY AND ELECTRONICS IN 1962.
4 Sep 62, 44p. (Reference bib. no. 13)
(Contract AF 19(628)500)
(AFESD TDR 62-136) Unclassified report

DESCRIPTORS: *Electronics, *Radio, *Bibliography, Textbooks, Reports, Scientific reports, USSR.

AD-285 492 Div. 8, 1
(TISTA/GEC) OTS price $1.10

General Electric Co., Utica, N. Y.
QRC-139A AEROSPACE GROUND EQUIPMENT (AGE).

Monthly progress rept. no. 7, 6 Sep-5 Oct 62, 5 Oct 62, 8p.
(Contract AF 33(604)39443)
Unclassified report

DESCRIPTORS: *Radiofrequency spectrum analyzers, Broadband, S band, L band, Ground support equipment, Electronic equipment, Research program administration.

This report describes the work accomplished on the design and development of a Broadband Spectrum Analyzer, Converter-Measuring, Frequency ''S'', and Converter-Measuring, Frequency ''L'' (Author)

AD-285 511 Div. 8
(TISTE/CAM) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
EFFECTS OF IMPULSE NOISE ON DIGITAL DATA TRANSMISSION.
Master's thesis,
by Andrew B. Bodonyi. 11 Dec 61, 23p. illus. 14 refs. (Research rept. no. PIBMRI-975-61)
(Contract AF 10(600)1505)
(AFOSR-1989) Unclassified report

DESCRIPTORS: *Data transmission systems, *Digital systems, *Noise (Radio), Probability, Errors, Pulse modulation, Frequency shift keyers, Phase shifters, Signal-to-noise ratio, Sequences, Coding, Analysis, Theory.

Presented are the basic characteristics of impulse noise and effects of impulse noise on various types of binary data transmission systems. The sources, and properties of such impulse noise, in contrast with gaussian noise are discussed. A method is described for the experimental comparative evaluation of bit error rates in presence of additive impulsive noise. The method is shown to permit unique comparison between the three modulation schemes tested, namely on/off carrier, frequency shift and diphase (phase reversal keying, with coherent detection). The major conclusions drawn for these experiments are: (1) The choice of modulation scheme has a lot greater effect on the overall error rates in presence of impulse noise than it does for the gaussian case. (2) The simple error-detecting and error-correcting systems, designed to combat the effects of gaussian noise, can be utilized only to a fraction of their theoretical advantage in case of impulse noise. (3) The best results can be obtained from the coherent PSK system at high signal-to-noise ratios. (Author)

AD-285 513 Div. 8, 25
(TISTP/TL) OTS price $2.60

Varo, Inc., Garland, Tex.
DESIGN OF A PARALLEL PLATE MICROWAVE LENS,
by Winfield W. Salisbury and William R. Flynt.
22 Aug 62, 25p. incl. illus. table, 1 ref.
(Contract AF 30(602)2336, Proj. 5561)
(RADC TDR 62-431) Unclassified report

DESCRIPTORS: *Microwaves, *Lens antennas, Sheets, Propagation, Refractive index, Energy, Narrowband, Optics, Ellipsoids, Design.

Two parallel plate microwave lenses were investigated. These lenses operate on the principle that microwave energy will propagate between parallel conducting sheets with a phase velocity exceeding that of light; hence, this 'medium' has an apparent index of refraction which is less than unity. When the bounding contours of such an assembly of plates are suitably shaped, then the assembly is analogous to an optical lens, and can be made to focus microwave energy. In this case, the bounding contours have the form of ellipsoids of revolution, and the equations and parameters necessary to shape the contours properly are derived and discussed. A complete design is described for a 5 foot square lens with focal length of 5 feet and an index of refraction of 9/16, operated at a wavelength of 12.5 cm. (Author)

AD-285 517 Div. 8
(TISTE/CAM) OTS price $1.60

RCA Labs. Div., Radio Corp. of America, Princeton, N. J.
HIGH-FIELD STUDY OF A HALL-EFFECT MICROWAVE CONVERTER.
Scientific rept. no. 1, Jan-Aug 62,
by K. K. N. Chang and R. D. Hughes. 31 Aug 62, 12p. incl. illus. 7 refs.
(Contract AF 19(628)262, Proj. 4645)
Unclassified report

DESCRIPTORS: *Frequency converters, Hall effect, Microwaves, Sensitivity, Magnetic fields, Electric fields, Cavity resonators, Modulation, Dielectrics, Coupling circuits, Model tests, Radiofrequency power, Microwave networks, Dioxides, Titanium compounds.

A reentrant coaxial cavity was used to study the Hall-Effect converter. A disk-shaped InSb sample about .005 in. thick and .200 in. in diameter was mounted at the reentrant post. The reentrant gap was filled with another disk made of high dielectric constant material, such as rutile. The purpose of this disk was to concentrate the rf magnetic field near the sample so that coupling to the field could be achieved efficiently. The input signal and pump were applied to the cavity through the coupling loop. The output rf signal, whose frequency is the difference of the signal frequency and the pump frequency, was derived through the Hall effect and fed to the coaxial line. The reentrant cavity is characterized by a high rf field concentration near the post where the sample is mounted. The signal has an azimuthal magnetic field around the sample which is used to modulate the axial field Ez due to the pump. The resulting Hall field was produced radially in the sample. The rf field is expected to be nonuniform. An average uniform field was assumed. The experiments were performed mostly at 77 K. The cavity was vacuum sealed into a metallic container, cooled in a Dewar flask filled with liquid nitrogen. (Author)

AD-285 566 Div. 8
(TISTP/TL) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
DELAY-LOCK TRACKING OF BINARY SIGNALS.
Technical report on Communications,
by J. J. Spilker, Jr. Sep 62, 30p. incl. illus. refs. (Rept. no. 6-90-62-85)
Unclassified report

DESCRIPTORS: *Radar tracking, *Delay circuits, *Discriminator, *Sequences, *Nonlinear systems, *Feedback, Statistical functions, Radar receivers, Noise (Radar), Tests, Broadband, Signals, Probability.

The theory of operation and an evaluation of performance of a delay-lock tracking system for binary signals is presented. The delay-lock discriminator is a nonlinear feedback system which employs a form of cross-correlation in the feedback loop. Its function is to estimate continuously the relative delay between a reference signal and a delayed version of that signal which is perturbed with additive noise. Binary maximal-length shift-register sequences are used as the signal because they can easily be regenerated with any desired delay and because they

possess desirable autocorrelation functions. Problems of target search and acquisition are studied. The system performance in the presence of additive Gaussian noise is discussed. Computations are made of the effect of amplitude-limiting the received data on the system noise performance. (Author)

AD-285 572 Div. 8, 9
(TISTP/TL) OTS price $.50

Diamond Ordnance Fuze Labs., Washington, D. C.
FLUID AMPLIFICATION. 3. FLUID FLIP FLOPS AND A COUNTER,
by R. W. Warren. 25 Aug 62, 25p. incl. illus.
(DOFL rept. no. TR-1061)
(DOFL Proj. 31100)
Unclassified report

DESCRIPTORS: *Fluid flow, *Amplifiers, *Pneumatic systems, *Hydraulic systems, Design, Pulse counters, Frequency converters, Switching circuit, Control systems, Orifices.

The operating principles of a single-input, fluid-operated flip flop which employs no moving mechanical parts are explained in detail. The principles of the dual-input flip flop are reviewed, and the discussion is extended to the single-input case. Staging is discussed and an example of cascaded staging in a fluid binary counter is given. (Author)

9. FLUID MECHANICS

AD-284 663 Div. 9, 27, 10
(TISTA/SEB) OTS price $6.60

United Technology Corp., Sunnyvale, Calif.
DYNAMICS OF TWO-PHASE FLOW IN ROCKET NOZZLES. Quarterly technical progress rept. no. 5, 1 May-31 July 62,
by B. G. Wrenn, R. Dunlap and others. 30 Aug 62, 63p. incl. illus. refs. (Rept. no. 2005 QT5)
(Contract NOw 61-0760-c)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, *Exhaust gases, Fuel additives, Aerodynamics, Particles, Metals, Particle trajectories, Velocity, Drag, Model tests, Dynamics, Equations, Theory, Mathematical analysis, Gas flow, Solid rocket propellant.

An experimental and theoretical investigation is being conducted of the axial and radial velocity lag of a dispersed solid phase in accelerating gases. The program objective is to generate basic information and nozzle design criteria for the flow dynamics of the two-phase flow resulting from the combustion of metalized solid propellants. The correction of the particle size of molecular-sieve powder used in calculation of the cold-flow differential nozzle flow has resulted in improved agreement of theory and experiment. Experimental studies of two-dimensional particle trajectories in nozzles (0.250 inch throat diameter), covering a large variety of conditions, have been performed. A theory to predict particle trajectories in the subsonic portion of nozzles has been developed and compared to experimental results. A preliminary study of the effect of particle radial velocity lag on characteristic velocity has been performed. (Author)

AD-284 697 Div. 9
(TISTP/WH) OTS price $7.60

Polytechnic Inst. of Brooklyn, N. Y.
SOME PERTURBATION SOLUTIONS IN LAMINAR BOUNDARY LAYER THEORY, PART I. THE MOMENTUM EQUATION,
by Paul A. Libby and Herbert Fox. Aug 62, 69p. incl. illus. tables, 21 refs. (PIBAL rept. no. 752)
(Contract AF 49(638)217, Proj. 9781)
Unclassified report

DESCRIPTORS: *Fluid mechanics, *Laminar boundary layer, *Perturbation theory, *Velocity, Partial differential equations, Integration.

Velocity fields are considered which are associated with a variety of flows and which may be described by perturbations of the Blasius solution. These are flows which, for example, because of localized mass transfer involve the initial value problem of boundary layer theory, flows with variable ratio of viscosity-density product, and flows with mass transfer. The perturbation solutions are presented in accord with the usual linearization procedures so that further applications for the determination of first-order effects can be readily made. The results of such applications in several cases are compared to more accurate solutions. (Author)

AD-284 698 Div. 9
(TISTP/WH) OTS price $3.60

Polytechnic Inst. of Brooklyn, N. Y.
SOME MASS TRANSFER EFFECTS ON THE WALL JET,
by Herbert Fox and Martin H. Steiger. Aug 62, 29p. incl. illus. tables, 13p. (PIBAL rept. no. 757)
(Contract AF 49(638)217, Proj. 9781)
(AFOSR-3056) Unclassified report

DESCRIPTORS: *Fluid mechanics, *Jets, *Continuum mechanics, *Heat transfer, Sheets.

The wall jet with suction or injection is investigated; an analysis under conditions corresponding to similar flows is shown to reduce to an eigenvalue problem. Asymptotic solutions valid far from the surface are used to initiate the integration and circumvent the usual iteration associated with the two-point boundary value problem. Typical solutions for various rates of suction and injection are obtained. It is found that the skin friction decreases with increasing rate of suction. Representative thermal solutions are obtained for Prandtl and Lewis numbers equal to one, under the special condition that the surface temperature is equal to the ambient temperature or that the enthalpy varies monotonically from the surface value to the ambient value. (Author)

AD-284 699 Div. 9, 25
(TISTP/WH) OTS price $7.60

Polytechnic Inst. of Brooklyn, N. Y.
ON THE DISTRIBUTION OF ENTROPY WITHIN THE STRUCTURE OF A NORMAL SHOCK WAVE,
by Morris Morduchow and Paul A. Libby. Aug 62, 70p. incl. illus. 57 refs. (PIBAL rept. no. 759)
(Contracts AF 49(638)445 and AF 49(638)217, Proj. 9781)
(AFOSR-3198) Unclassified report

DESCRIPTORS: *Shock waves, *Entropy, *Thermal conductivity, Continuum mechanics, Fluid mechanics, Differential equations.

A unified mathematical account is given of the available knowledge, together with additional new results, of the entropy distribution through a normal shock wave. The most notable feature of this distribution is the fact that as long as heat conductivity is present the entropy will first increase within the shock until it reaches

a maximum value at a certain point inside of the shock, and then diminishes to its final value behind the shock. A physical discussion of the results is given in addition to a review of the phenomena not usually included in the analysis of shock wave structure. A systematic review of classical shock wave structure according to the Navier-Stokes equations is included here together with a discussion of the physical validity of these equations. The structure of, and the entropy distribution within weak shock waves in general, and shock waves of arbitrary strength with Prandtl numbers of 0, 3/4 and infinity are analyzed in detail, together with qualitative results for shock waves in general. (Author)

AD-284 853 Div.
(TISTA/VGW) OTS price $5.60

Max-Planck-Institut fur Aeronomie (Germany).
THREE-COMPONENT-MEASUREMENTS ON DELTA WINGS WITH CAVITATION.
Final rept.,
by H. Reichardt and W. Sattler. July 62, 51p. incl. illus. 8 refs.
(Contract N62558-2196)
Unclassified report

DESCRIPTORS: *Triangular wings, *Hydrofoils, *Cavitation, Fluid flow, Water tunnels, Model tests, Strain gages, Measurement, Hydrodynamics, Lift.

Three-component-measurements on delta wings with different apex angles (15, 30, 45, 60 degrees) and at different cavitation numbers were undertaken. These measurements showed that the lift coefficient cL as a function of the angle of incidence is in agreement with the theory of K. Gersten (Tragflugeltheorie bei Unterschallgeschwindigkeit. WGL-Jahrbuch 1958 S.25), if there is no cavitation. The cavitation reduces the lift with increasing size of the pocket. For small angles of incidence the cL(alpha)-curves asymptotically approach the limiting curve for lift of cavitation-free flow. This could be qualitatively explained by means of photographs of the flow. These photographs also show that two separate pockets develop on the suction side of a delta wing, and these remain separated even for the smallest cavitation numbers. (Author)

AD-284 877 Div. 9, 1
(TISTA/GEC) OTS price $2.00

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
STUDY OF HELICOPTER ROTOR-ROTOR INTERFERENCE EFFECTS ON HUB VIBRATION.
Final report on Dynamic Problems of Flight Vehicles,
by J. F. Duvivier. June 62, 68p. incl. illus. tables, refs.
(Contract AF 33(616)6757, Proj. 1370)
(ASD TR 61-601) Unclassified report

DESCRIPTORS: *Helicopter rotors, *Helicopter blades, Aerodynamics, Load distribution, Pressure, Vibration, Resonance, Harmonic analysis, Theory, Aerodynamic data, Mathematical analysis, Shear stresses.

A study of the effect of spacing between tandem three-bladed helicopter rotors on the vertical and in-plane shears transmitted at the rear rotor hub was made in a wind tunnel by exciting the rear rotor in resonance with the third harmonic airload. Theoretical third harmonic vertical shears based on Mangler's inflow distribution for a single rotor are compared with the experimental results measured on a single rotor and at the rear rotor of four tandem configurations. First harmonic vertical and in-plane shears and sixth harmonic vertical shears are also presented. Pressure measurements made at ten points of one blade were used for correlation with the measured vertical shears, and one case of harmonic airload distribution is presented. Harmonic analyses of the test data are included. (Author)

AD-284 914 Div. 9
(TISTA/SEB) OTS price $5.60

Naval Ordnance Lab., White Oak, Md.
SUPERSONIC AERODYNAMIC HEAT TRANSFER AND PRESSURE DISTRIBUTIONS ON A SPHERE-CONE MODEL AT HIGH ANGLES OF YAW,
by Lionel Pasiuk. July 62, 10p. illus. tables. (Rept. no. NOLTR 62-35)
Unclassified report

DESCRIPTORS: *Conical bodies, Spheres, Heat transfer, Pressure, Yaw, Model tests, Wind tunnel models, Laminar boundary layer, Turbulent boundary layer, Measurement, Temperature, Theory, Test methods, Aerodynamic heating, Supersonics.

Measurements of the static pressure and aerodynamic heat transfer on the surface of a sphere-cone model at Mach numbers of 3.23 and 4.83, and angles of yaw of 6 and 18 degrees were made. The results of several theoretical methods for calculating both the laminar and turbulent heat transfer to the body along the most windward and leeward streamlines are compared with the experimental measurements. The experimental laminar heat-transfer distributions are nearly alike for the two Mach numbers, when they are expressed in the form of the Nusselt number divided by the square root of the Reynolds number. The experimental heat-transfer data indicate that an increasing angle of yaw can induce transition from laminar to turbulent boundary layer. (Author)

AD-284 924 Div. 9, 25
(TISTP/WH) OTS price $4.60

University of Southern Calif. Engineering Center, Los Angeles.
SELF-SIMILAR AND PSEUDOSIMILAR SOLUTIONS OF BLAST WAVES IN ELECTROGASDYNAMICS,
by Koichi Oshima. Aug 62, 37p. incl. illus. tables, 12 refs. (USCEC rept. no. 83-215)
(Contract AF 49(638)831, Proj. 9783)
Unclassified report

DESCRIPTORS: *Plasma physics, *Shock waves, *Gas flow, *Superaerodynamics, *Hypersonic flow, Electrons.

Using the electrogasdynamical equations and the Poisson equation, a characteristic length Re, which is proportional to the Debye length divided by a ionization rate of a gas, is defined. The length plays an important role in the electrogasdynamical blast wave. Since the classical gasdynamical blast wave with a constant energy contained in it has a characteristic length, Ro, which is defined by the constant energy, the essential parameters of the electrogasdynamical blast wave with a constant energy in it are Ro and Re, or the square of its ratio, Ao. A self-similar solution of the electrogasdynamical blast wave is found. Its shock front propagates exponentially with time and its energy also increases exponentially with time. Several numerical calculations with various values of the parameter, Re, have been carried out. This solution contains a classical gasdynamical blast wave as a limiting case of Re approaches infinity. (Author)

AD-285 037 Div. 9, 1
(TISTA/GEC) OTS price $17.00

General Electric Co., Cincinnati, Ohio.
RESULTS OF STATIC TEST OF A FULL SCALE, WING MOUNTED, TIP TURBINE DRIVEN LIFT FAN.
Rept. for Dec 60-Apr 61.
Mar 62, 249p. incl. illus. tables.
(Contract DA 44-177-tc-584)
(TCREC TR 62-21)
Unclassified report

DESCRIPTORS: *Ducted fans, *Vertical take-off planes, Aerodynamic configurations, Duct inlets, Roll, Yaw, Stability, Aerodynamics, Turbojet engines, Design, Aerodynamic data, Test methods, Effectiveness, Tests.

Results are presented of static tests of 53 hr duration conducted on the X353-5 ducted fan mounted in a 10% thick wing. Included are: Descriptions of the test vehicle, facility, instrumentation and equipment; test procedures and results; analysis of test results, conclusions and discussion of any problems encountered; hardware inspection results; and program recommendations. (Author)

AD-285 079 Div. 9, 1
(TISTA/GEC) OTS price $12.50

Vehicle Research Corp., Pasadena, Calif.
DEVELOPMENT OF METHODS FOR PREDICTING V/STOL AIRCRAFT CHARACTERISTICS.
Final rept. on Phase III,
by Scott Rethorst, Toshio Fujita and others.
31 Dec 61, 172p. incl. illus. tables, 16 refs.
(Rept. no. 12)
(Contract Nonr-309900)
Unclassified report

DESCRIPTORS: *Vertical take-off planes, *Short take-off planes, *Helicopters, Mathematical analysis, Mathematical prediction, Convertible airplanes, Design, Operations research, Air force operations, Military requirements, Jet planes, Flight paths, Aerodynamic configurations, Airframes, Load distribution, Computers, Nomographs, Tables, Aerodynamics.

The analyses of the previous Phase I (AD-244 736) and Phase II (AD-257 571) studies are extended and refined. The relationships among basic V/STOL performance parameters are brought into focus. Results are cast into an engineering form. A 'slide-rule' type computer and a set of nomographs are furnished to simplify prediction of V/STOL aircraft characteristics. Propeller-driven V/STOL aircraft are analyzed in terms of trade-offs among basic performance parameters for a generalized mission profile. The attainment of high performance potential is dependent on the basic aerodynamic parameters governing the forward flight capabilities of conventional aircraft. For V/STOL aircraft the variable disc area parameter (ratio of hovering disc area to forward flight disc area) has a marked effect on performance potential. The 'slide-rule' and nomographs encompass a wide range of basic parameters including variable disc area and are applicable to prop-driven V/STOL aircraft. The analytical methods are applied to an advanced V/STOL specification (including growth potential as quantitatively determined in the analysis). (Author)

AD-285 293 Div. 9, 31
(TISTP/TL) OTS price $7.60

Ordnance Research Lab., Pennsylvania State U., University Park.
A METHOD FOR THE DESIGN OF A SKEWED MARINE PROPELLER BASED ON WEISSINGER'S L-METHOD.
Technical memo.,
by R. E. Henderson. 4 Oct 62, 59p. incl. illus. 19 refs.
(Contract NOrd-16597)
Unclassified report

DESCRIPTORS: *Marine propellers, *Fluid flow, Vortices, Theory, Velocity, Lift, Surfaces, Thrust, Loading, Numerical analysis, Integration, Bessel functions, Cavitation, Thrust, Real variables, Design, Hydrodynamics.

A theoretical method is presented for the design of a marine propeller with non-radial or skewed blades. The method is based on Weissinger's L-Method with each blade replaced by a bound vortex along its quarter chord line. The velocity induced by the complete bound and trailing vortex system along the three-quarter chord line is specified to satisfy the condition of tangency to the mean camber line. The effects of non-uniform inflow and finite-thickness are included. The induced velocity is calculated by applying the law of Biot-Savart to the vortex system representing the blade. The integration of this law for the trailing vortex system gives a solution consisting of the tabulated solution of Lerbs for an unskewed blade designed using Prandtl's lifting line theory plus an additional solution representing the effect of skew and the use of Weissinger's L-Method. (Author)

AD-285 385 Div. 9, 4
(TISTP/MS) OTS price $2.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
USE OF ELECTROCHEMILUMINESCENCE FOR VISUALIZING FIELDS OF FLOW,
by Bradford Howland, Walter H. Pitts, and Robert C. Gesteland. 21 Sep 62, 28p. incl. illus. tables, 10 refs. (Technical rept. no. 404)
(Contract DA 36-039-sc-78108, Proj. 3-99-00-000)
Unclassified report

DESCRIPTORS: *Luminescence, *Fluid flow, *Luminescent materials, Boundary layer, Test methods, Hydrofoils, Electrochemistry, Visibility.

A platinum hydrofoil is immersed in a flowing, alkaline solution containing luminol (5-amino-2,3-dihydro-1,4-phthalazinedione) and H_2O_2. Anodic current, replacing the usual chemical catalysis, generates a bright surface glow with intensity distribution controlled by mass transfer. This displays the flow at the boundary layer without disturbing it. A methanolic solution shows also the flow behind the hydrofoil; the luminescence leaves the anode and extends downstream for a distance determined by the acidity. The subsequent history of parcels of fluid passing by any part of the hydrofoil can thus be traced. Fluid may be recirculated; operation with organic solvents of low kinematic viscosity is possible. Laminar and turbulent boundary layers, various wakes, and vortex streets are illustrated. (Author)

AD-285 447 Div. 9
(TISTP/FR) OTS price $4.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
FORCES AND MOMENTS ON AN OSCILLATING HYDROFOIL,
by Peter Crimi and Irving C. Statler. Aug 62, 44p. incl. illus. tables, 11 refs. (Rept. no. BB-1629-S-1)
(Contract Nonr-357800)
Unclassified report

DESCRIPTORS: *Hydrofoils, Oscillation, Moments, Lift, Equations, Algebra, Integral equations, Functions.

Results are presented of a theoretical study to determine the forces and moments acting on an oscillating, near-surface hydrofoil in two-dimensional, linearized potential flow. The flow was assumed to be non-cavitating, but no limitations were placed on the values of Froude number or depth-to-chord ratio. Results are presented in graphical and tabular form, lift and moment being given as functions of reduced frequency with Froude number and depth-to-semi-chord ratio as parameters. (Author)

AD-285 506 Div. 9, 15
(TISTP/TL) OTS price $3.60

AVCO Everett Research Lab., Mass.
CALCULATION OF HEAT TRANSFER FROM SIMILARITY BOUNDARY LAYER EQUATIONS BY A SIMPLE INTEGRAL METHOD,
by Nelson H. Kemp. June 62, 32p. incl. illus. tables, 12 refs. (Research rept. no. 137)
(Contract AF 04(694)33)
(BSD TDR 62-171) Unclassified report

DESCRIPTORS: *Heat transfer, *Boundary layer, *Differential equations, Shock tubes, Gas flow, Shock waves, Reflection, Thermodynamics, Equations, Algebra, Numerical analysis.

A simple integral method is developed for calculation of the heat transfer rate from similarity boundary layer equations with arbitrary variation of fluid properties. The method is applied to the end wall of a shock tube behind a reflected shock in a perfect gas, and to the stagnation point for a gas in thermodynamic equilibrium with Lewis number unity. Explicit formulas and results are obtained when the fluid properties are powers of the enthalpy or temperature, and the Prandtl number is constant. For the end wall geometry, an analytical expression for the heat transfer rate is derived which can be correlated with exact calculations within ±3% for all cases compared. For the stagnation point geometry, two pair of transcendental algebraic equations are obtained, one pair of which gives the heat tranfer rate when the momentum layer is thinner than the energy layer, the other pair when it is thicker. Numerical solutions of these equations can be correlated with exact solutions to within ±4%. The integral method indicates the pressure gradient parameter and Prandtl number can be combined into only one parameter, and examination of results of exact calculations shows this correlation to be quite accurate. (Author)

AD-285 530 Div. 9
(TISTP/TL) OTS price $2.60

St. Anthony Falls Hydraulic Lab., U. of Minn., Minneapolis.
UNSTEADY, SYMMETRICAL, SUPERCAVITATING FLOWS PAST A THIN WEDGE IN A SOLID WALL CHANNEL,
by C. S. Song and F. Y. Tsai. June 62, 32p. incl. illus. 7 refs. (Technical paper no. 38, Series B)
(Contract Nonr-71024, Proj. NR 062-052)
Unclassified report

DESCRIPTORS: *Fluid flow, *Wedges, *Perturbation theory, *Cavitation, *Water tunnels, Pressure, Velocity, Drag, Liquid jets, Partial differential equations, Integral transforms, Transformations (Mathematics), Experimental data.

Problems of symmetrical two-dimensional supercavitating flow about a thin wedge in a finite fluid with two parallel solid boundaries are solved by means of a linearized method utilizing the complex acceleration potential. The solution contains no singularity and, as a result, pressure is finite everywhere. The term indicating the effect of cavity pressure change on the drag which existed in the case of the flows with free boundaries is identical to zero when the boundaries are solid. It is also concluded that, in steady flow cases, the accuracy of the solutions using the linearized acceleration potential method is comparable to that using the linearized velocity potential method. The two methods give identical solutions when cavities are infinitely long. (Author)

AD-285 531 Div. 9, 2
(TISTP/JW) OTS price $2.60

St. Anthony Falls Hydraulic Lab., U. of Minn., Minneapolis.
A DYNAMOMETER FOR THE TWO-DIMENSIONAL, FREE-JET WATER TUNNEL TEST SECTION,
by E. Silberman and R. H. Daugherty. June 62, 26p. incl. illus. 2 refs. (Technical paper no. 40, Series B.)
(Contract Nonr-71024, Proj. NR 062-052)
Unclassified report

DESCRIPTORS: *Dynamometers, *Strain gages, *Water tunnels, Test equipment, Jets, Hydrodynamics, Angle of attack indicators.

A new dynamometer system has now been placed in operation in the two-dimensional test section of the free-jet water tunnel and has given satisfactory service for one year. It is a displacement type instrument, small displacements being measured by strain gages comented to flexure members. There are actually two identical dynamometers, one for the front face and one for the rear face of the tunnel. One of these is installed in the front face of the tunnel and photographs showing the assembly of the essential elements of the dynamometer are presented. (Author)

AD-285 537 Div. 9
(TISTP/TL) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
THE EFFECTS OF DRIVER TEMPERATURE GRADIENT ON SHOCK TUBE FLOW,
by Lawrence Y. Lamb. 25 Apr 62, 34p. incl. illus. (Rept. no. TDR-930(2230-11)TN-1)
(Contracts AF 04(647)930 and AF 04(647)309)
(DCAS TDR 62-111) Unclassified report

DESCRIPTORS: *Shock tube, *Gas flow, *Shock waves, Temperature, Turbulent flow, Theory, Experimental data, Helium, Mach number.

Shock tube initial condition is considered in which an axially distributed temperature gradient exists within the driver gas. Theoretical analysis of the wave interactions revealed that compression waves originating from the hotter regions of the driver gas overtake the shock wave and reinforce it progressively. A comparison is made of this case with the usual uniform-temperature driver case (zero gradient). A series of tests was conducted to correlate theory with experiment. The results qualitatively verified theoretical predictions that the compression waves reinforce the propagating shock wave. This phenomenon should minimize the effects of attenuation in shock tube flows. (Author)

AD-285 538 Div. 9
(TISTA/GEC) OTS price $6.60

Aerospace Corp., Los Angeles, Calif.
VISCOUS AND INVISCID STAGNATION FLOW IN A DISSOCIATED HYPERVELOCITY FREE STREAM.

by G. R. Inger. 15 July 62, 59p. incl. illus. table (Rept. no. TDR-69(2230-06)TR-2)
(Contract AF 04(695)69)
(DCAS TDR 62-143) Unclassified report

DESCRIPTORS: *Blunt bodies, Hypersonics, Dissociation, Gas flow, Boundary layer, Viscosity, Shock waves, Heat transfer, Gas ionization, Vortices, Mathematical analysis, Theory, Oxygen, Nitrogen, Aerodynamics.

The effects of nonequilibrium free stream dissociation on hypersonic stagnation flow over a blunt-nosed body are analyzed and compared to the similar flow in an initially undissociated ambient gas. The theory is primarily concerned with the case of high Reynolds number flows in which a thin, highly-cooled boundary layer and equilibrium inviscid flow exist. Significant changes in the bow shock geometry, stagnation gas state, and nonequilibrium heat transfer are found when the free stream dissociation involves more than 10% of the total energy. It is observed that for large amounts of both atomic O and N ahead of the body, the equilibrium shock layer properties converge toward those pertaining to chemically and vibrationally-frozen flow across the bow shock. Moreover, under certain conditions, the equilibrium ionization and radiant heat transfer can be increased by an order of magnitude, and the usual reduction in frozen boundary layer heat transfer due to a highly-cooled non-catalytic surface can increase two-fold. Low Reynolds number effects, including nonequilibrium relaxation behind the bow shock, are examined. Free stream dissociation can substantially enhance the freezing of the shock layer while simultaneously delaying the onset of vorticity interaction and viscous layer effects. (Author)

AD-285 586 Div. 9, 1
(TISTA/GEC) OTS price $2.75

Vertol Div., Boeing Co., Morton, Pa.
IN-FLIGHT MEASUREMENT OF HELICOPTER ROTOR SHAFT LOADS UNDER CONTROL CYCLIC TRIM VARIATIONS.
Final rept., Mar 59-Oct 61 on Dynamic Problems in Flight Vehicles,
by Robert G. Ricks, Peter Shyprykevich and others.
June 62, 126p. incl. illus. tables, 5 refs.
(Contract AF 33(616)7292, Proj. 1370 and DA Proj. 9R-38-11-009-05)
(ASD TR 61-523) Unclassified report

DESCRIPTORS: *Helicopter rotors, *Helicopter blades, Flight testing, Load distribution, Pressure, Aerodynamics, Vibration, Helicopters, Control systems, Analysis, Fuselages, Torque, Measurement, Cockpits, Computers, Aerodynamic data, Roll, Pitch, Harmonic analysis, Shafts, Loading.

The hub load measurement system developed for the H-21 helicopter was used for measuring metal blade loads for standard controls and combinations of Differential Longitudinal Cyclic Trim. Cockpit floor motions were measured concurrently to permit correlation of load and vibration data. The helicopter was flown at 13,500 lb. normal gross weight, through an airspeed sweep and two rotor speed sweeps for metal blade evaluation with standard controls. At the same gross weight, the effect of longitudinal cyclic was investigated. The data was computer processed to provide rotating and fixed coordinate system loads on the fuselage and correlative vibration data. Torque distribution between rotors and total power for each cyclic configuration was obtained from torque bridges located on the forward and aft synchronizing shafts. (Author)

10. FUELS AND COMBUSTION

AD-284 554 Div. 10, 27, 30
(TISTA/SEB) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
VIRTUAL SPECIFIC ACOUSTIC ADMITTANCE MEASUREMENTS OF BURNING SOLID PROPELLANT SURFACES BY A RESONANT TUBE TECHNIQUE,
by Richard Strittmater, Leland Watermeier and Samuel Pfaff. June 62, 21p. incl. illus. 2 refs.
(BRL memo. rept. no. 1412)
Unclassified report

DESCRIPTORS: *Propellant grains, *Solid rocket propellants, *Jet acoustic oscillations, Acoustics, Resonance, Test equipment, Test methods, Measurements, Tests, Pressure, Stability, Surface properties, Combustion.

A resonance tube technique was used to measure the virtual specific acoustic admittance at the surface of a burning solid propellant. The admittance determined by experiments is directly related to the propellant amplification function. Only the real part of the complex admittance is presented because of its importance in determining the acoustic power generating capacity of a burning propellant. A cast double-base propellant, ARP, was investigated. Results are given in the frequency range from 3500 to 13,500 cps and in the mean chamber pressure range from 310 to 1030 psi. The theory that forms the basis for the analysis of data is given together with approximate working equations. (Author)

AD-284 919 Div. 10
(TISTA/SEB) OTS price $5.60

Jet Propulsion Center, Purdue U, Lafayette, Ind.
AN EXPERIMENTAL INVESTIGATION OF LONGITUDINAL COMBUSTION PRESSURE OSCILLATIONS.
Interim rept. no. 6,
by J. R. Osborn and R. L. Derr. Aug 62, 50p. incl. illus. 9 refs. (Rept. no. I-62-8; JPC-315)
(Contract Nonr-110021)
Unclassified report

DESCRIPTORS: *Combustion, Jet acoustic oscillation, Theory, Tests, Pressure, Combustion chambers, Configuration, Design, Fuel injection, Gaseous rocket propellants, Liquid rocket propellants, Heat transfer, Test equipment, Test methods, Stability.

The longitudinal mode of combustion pressure oscillations in a rocket motor was investigated. A premixed gaseous type rocket motor was utilized for this work. Experimental findings showed no change in oscillations when the heat transfer characteristics of the injector were varied. Any mechanism for longitudinal oscillations in a premixed gaseous rocket motor based on an oscillatory heat transfer to the injector is inadequate. (Author)

AD-285 192 Div. 10
(TISTM/EJH) OTS price $11.50

Rohm and Haas Co., Huntsville, Ala.
THE MODIFIED WAGON WHEEL GRAIN DESIGN W1 GREATER THAN W2 = W3; W1 = W2 GREATER THAN W3; W1 = W3 GREATER THAN W2.
Final Rept. no. 3,
by Max W. Stone. 1 Oct 62, 1v. incl. illus. tables (Rept. no. S-36)
(Contract DA 01-021-ORD-11878)
Unclassified report

DESCRIPTORS: *Propellant grains, *Solid

rocket propellants, *Tables, Configuration, Mathematical analysis, Programming, Combustion, Surfaces, Design.

A modification of the wagon wheel grain design is considered in which short spears or spokes of propellant alternate with longer ones, and in which 3 different webs give rise to a 3-level surface-time history. There are 6 possible combinations of these webs under the limitation that the outer web must always be equal to or greater than either of the other two. This report discusses the analysis for the cases where $w1 > w2 = w3$, $w1 = w2 > w3$ and $w1 = w3 > w2$, and presents tabulated data resulting from the solution for a wide range of parameters of the equations which characterize the designs. (Author)

AD-285 282 Div. 10
(TISTA/GEC) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
EFFECT OF AERODYNAMIC-HEATING SIMULATION ON MARK 24 SIDEWINDER 1C SUSTAINER GRAINS,
by W. W. Boyle. Sep 62, 22p. incl. illus. tables.
(NOTS TP 2912)
(NAVWEPS rept. no. 7905)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Propellant grains, Simulation, Guided missiles (Air-to-air), Tests, Rocket motors, Ethyl cellulose, Physical properties, Rocket motors, Aerodynamic heating.

Sidewinder 1C sustainer grains were given aerodynamic-heating cycles to determine damaging effects on the propellant and its peripheral inhibitor. Propellant grains were heated in a thin-walled motor tube having a nichrome-ribbon heating element on its outer surface. Ethyl cellulose inhibitor on the propellant grain proved to be most susceptible to degradation. Cracks in the inhibitor and large unbonded areas developed after 5 to 10 mission cycles. A mission cycle consisted of increasing the skin temperature from 130 to 250 F in 3 min, remaining at 250 F for 12 min, rising from 250 to 275 F in 2 min, then remaining at 275 F for 3 min followed by cooling to 130 F. (Author)

AD-285 338 Div. 10, 4
(TISTM/MS) OTS price $1.10

Aerospace Information Div., Washington, D. C.
COMBUSTION OF PROPELLANTS: AMMONIUM PERCHLORATE.
19 Sep 62, 2p. incl. illus. (AID rept. no. 62-139; Trans. from on the Combustion of Ammonium Perchlorate. Zhurnal Fizicheskoy Khimii, 36: no. 7, 1554-1555, July 1962)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Perchlorates, *Ammonium radicals, Ammonia, Low pressure research, USSR, Combustion.

Data are presented on ammonium perchlorate (AP) combustion compiled from experiments at the Institute of Chemical Physics, Academy of Sciences USSR, and is apparently intended to augment work done in the field by non-Soviet researchers. Applications of AP in aerospace technology are implied by the consideration in the article of the lower pressure limit for steady AP combustion. In addition, these experiments may be related to Soviet studies of the thermal decomposition of salts of ammonia and hydrazine. (Author)

AD-285 351 Div. 10, 4
(TISTM/SJR) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
PROPULSION RESEARCH PROGRAM. HYDRIDE AND FLUORIDE INVESTIGATIONS.
Semiannual technical rept., 1 Jan-30 June 62, by R. Tunder, S. G. Gibbins and others. 1 Aug 62, 11p. incl. illus. 11 refs. (Rept. no. TDR-69(2210-12)TR-2)
(Contract AF 04(695)69)
(DCAS TDR 62-165) Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Complex ions, *Hydrides, *Fluorides, Sulfur compounds, Silicon compounds, Nuclear magnetic resonance, Decaboranes, Mass spectroscopy, Grignard reagents, Formamides, Nitrobenzenes, Nitro radicals, Methyl radicals, Composite materials, Materials, Synthesis, Iron compounds, Quaternary amines.

The complex formed between sulfur tetrafluoride and tetramethyl ammonium fluoride has been almost completely characterized. The compound believed to be $(CH3)4N$ plus $SF5-$ is stable to 70 to 100 C and reacts with water, nitrobenzene, formamide, and monomethyl formamide. The fluorine nuclear magnetic resonance spectrum of the compound exhibits a single line quite different from that of F- or $SF4$. The reaction between ferric chloride, phenyl magnesium bromide and hydrogen to form iron hydrides was studied. The products have been separated into at least five separate solid components based on differential solubility in various basic solvents.

AD-285 473 Div. 10
(TISTM/ODN) OTS price $2.60

Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md.
MINIMIZING INITIATION HAZARDS THROUGH PROPER SELECTION OF MATERIALS OF FABRICATION,
by R. L. Keefe, E. A. Platt and R. H. Richardson. July 62, 23p. incl. illus. tables, 3 refs.
(Rept. no. ABL/Z-48)
(Contract NOrd-16640)
Unclassified report

Presented at the 4th Annual Explosive Safety Seminar on High Energy Solid Propellants, 7-9 Aug 1962, Langley Field, Va.

DESCRIPTORS: *Solid rocket propellants, *Hazards, Processing, Friction, Hardness, Impact shock, Materials, Vacuum seals, Ethylenes, Fluorides, Polymers, Sensitivity, Thermal conductance, Electrical conductivity, Stability, Manufacturing methods.

Information obtained from investigations conducted indicates that there are many factors to be considered in selecting the proper materials of fabrication for solid propellant processing facilities. Selecting the proper materials of fabrication can reduce the impact and friction hazards significantly. The impact and friction tests are excellent tools for dividing materials into general classes of usefulness. Although studies of the factors influencing impact and friction results are not complete, the modulus of compression, hardness, and coefficient of friction are some of the major factors to be considered. Consideration must be given not only to the impact and friction results and such factors as modulus of compression and coefficient of friction, but also thermal and electrical conductivity, structural strength, load bearing characteristics and dimensional stability. In addition, complete analysis with testing under simulated conditions is required to insure that the expected improvement is realized and does not create an unforeseen hazard. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

No Entries

12. GUIDED MISSILES

AD-284 799 Div. 12, 15
(TISTA/VGW) OTS price $3.60

Polytechnic Inst. of Brooklyn, N. Y.
ON TAKE-OFF FROM CIRCULAR ORBIT BY SMALL THRUST,
by Lu Ting and Sherwood Brofman. Aug 62, 28p. incl. illus. 5 refs. (PIBAL rept. no. 758)
(Contract AF 49(638)445, Proj. 9781)
Unclassified report

DESCRIPTORS: *Satellite vehicle trajectories, *Orbital flight paths, *Celestial mechanics, Thrust, Time, Mathematical analysis, Differential equatial equations.

Analytic solutions for the trajectories of taking off from a circular orbit by low thrust at a finite angle to the radial vector are presented. The solution is uniformly valid for the entire time interval measured from the initial instant of take-off, t=0, to t=O(1/epsilon) subjected to the upper limit set by the assumption of small thrust, where epsilon is the ratio of thrust to the central force at t=0. The zero order solution, which is in error to the order epsilon, is a function of the 'slow' time variable tau equals epsilon t and reduces to Tsien's solution (Jet Propulsion, v.23 (4):233-236, 1953) for circumferential thrust. Due to the long time interval, t=0 to O(1/epsilon) the standard techniques for the next order solution break down. The present solution is obtained by splitting it into two parts; one is a non-oscillatory function of tau and the other is an oscillatory function of t with varying periods. With this scheme it is possible to simplify the equations by estimating the order of magnitude of the terms for the entire interval. For the first order solution the non-oscillatory part is uniquely determined from an integral equation while the oscillatory term cannot be uniquely determined. This indeterminacy is removed by the requirement of the vanishing of the secular terms in the second order solution when the same scheme of splitting the solution is applied. Comparison with several results repeated to obtain higher order solutions. (Author)

AD-284 804 Div. 12, 8
(TISTA/VGW) OTS price $11.00

Philco Corp., Palo Alto, Calif.
POSITIVE COMMAND SYSTEMS STUDY. VOLUME I.
Technical documentary rept.,
31 July 62, 1v. incl. illus. tables, 35 refs.
(Rept. no. WDL-TR1813, vol. 1)
(Contract AF 04(695)113)
Unclassified report

DESCRIPTORS: *Command systems, *Secret communication systems, *Satellite vehicles, Design, Interference, Radio jamming, Telemeter systems, Radio interference, Coding, Feedback amplifiers, Remote control systems.

The methods and techniques used to insure that commands are received by an earth orbiting vehicle are described. The study shows that the certainty of command reception is improved by using bandwidths greater than normally necessary, and that frequency hopping over the larger bandwidth is the way to combat repeater jamming when detection security is not necessary. When detection security is required, the signal power is distributed over the entire bandwidth by coding and detecting the signal with matched filters. Authentication security is obtained by preceding each message with certain checks. (Author)

AD-284 807 Div. 12
(TISTA/SEB) OTS price $5.60

Philco Corp., Palo Alto, Calif.
A MAINTAINABILITY PROGRAM FOR AEROSPACE SYSTEM AND EQUIPMENT,
by Ronald A. Westland, C. E. Cunningham, and Donald T. Hanifan. Apr 62, 1v. incl. illus. table, 7 refs.
(Contract AF 04(647)829)
(SSD TDR 62-23) Unclassified report

DESCRIPTORS: *Ground support equipment, Maintenance equipment, Research program administration, Specifications, Failure (Mechanics), Detection, Test methods, Maintenance

A system maintainability analysis was studied to develop quantitative maintainability requirements for the systems and its subsystems and equipment. Time goals were established for the completion of maintenance tasks and the specification of a maintainability hardware approach, equipment design techniques and related procedures through which the maintenance time goals can be realized. A Maintainability Assurance Plan was developed to assure that maintainability requirements developed during the system analysis phase are incorporated into design. The plan includes design promulgation, training in maintainability principles, design guides and design consultation, design specification and design review. A Maintainability Evaluation Plan was also designed to test and evaluate the degree to which maintainability objectives were achieved, and to provide data on which to base improvements in criteria and design. (Author)

AD-284 903 Div. 12
(TISTW/RD) OTS price $15.00

General Electric Co., Burlington, Vt.
PARAMETERS AFFECTING PERFORMANCE OF PELLET FLOW ACCELEROMETERS.
Final rept.,
June 62, 215p. incl. illus. tables.
(Contract DA 36-034-ORD-3230)
Unclassified report

DESCRIPTORS: *Accelerometers, Pellets, Electrostatic fields, Orifices, Glass, Guided missiles, Guidance.

Contents:
Details of work performed on beads
Details of work on the performance of circular conical orifice efflux meters
Details of work on the performance of annular orifice reflux meters

AD-284 978 Div. 12, 15
(TISTP/WH) OTS price $3.60

Naval Postgraduate School, Monterey, Calif.
ORBITAL TRANSFER IN MINIMUM TIME,
by Willard E. Bleick. Aug 62, 32p. incl. tables, 6 refs. (Research paper no. 34)
Unclassified report

DESCRIPTORS: *Orbital flight paths, *Satellite vehicle trajectories, *Exterior ballistics, *Calculus of variations, Differential equations, Integration.

The problem of orbital transfer discussed is that of scheduling the direction of constant momentum thrust of a rocket, which loses mass at a constant rate, so that it transfers to an earth satellite orbit, with known elements of time, position and velocity, in a minimum time after launching. The launching conditions are assumed to be fixed. The problem is set up as a calculus of variations problem of the Lagrange type, and is solved by an iterative process in which an initial approximation to the angle B is estimated. (Author)

AD-285 045 Div. 12, 15, 19
(TISTW/PCR) OTS price $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PROJECT 861 ORBIT PROGRAMS,
by A. A. Mathiasen and W. R. Crowther. 31 Aug 62, 58p. incl. illus. tables (Rept. no. 21G-4; Supersedes rept. no. 21G-0026, AD-246 188 and rept. no. 21G-0028, AD-246 777)
(Contract AF 19(628)500)
(AFESD TDR 62-131) Unclassified report

DESCRIPTORS: *Satellite vehicle trajectories, *Orbital flight paths, Radar tracking, Data processing systems, Computer logic, Radar stations, Mathematical analysis.

In the Project 861 system, a radar will make observations on the Project 861 orbit and record these on magnetic tape (or, alternatively, on teletype tape). This tape will be processed by a point-selection program which filters the data and reduces the amount to a manageable size. A coordinate-conversion program then maps the data from the radar coordinate system to the geocentric equatorial system. An orbit-fitting program fits to the transformed data a Keplerian orbit. The orbit parameters are then used by a parameter-prediction program for ultimate input to the pointing program which supplies paper tapes with driving information for the Project 861 antennas. The coordinate-conversion program and the orbit-fitting program are described. (Author)

AD-285 139 Div. 12, 18
(TISTW/RD) OTS price $9.10

Caywood-Schiller, Associates, Chicago, Ill.
METHODS FOR ANALYSIS OF MULTI-PURPOSE SYSTEMS,
by Walter J. Strauss, James E. Hall, and Richard H. Rose. 30 Mar 62, 101p. incl. illus.
(Contract AF 33(616)8239)
Unclassified report

DESCRIPTORS: *Guided missiles (Air to air), *Guided missiles (Air to surface), Warfare, Combat, Interception probabilities, Bombers, Jet bombers, Operations research, Surface targets, Detection, Target recognition, Terminal ballistics, Aircraft, Costs, Multiple operation.

Methods for analyzing the desirability of a multi-purpose system over a single-purpose system are presented. These methods allow an analyst to evaluate the tactical flexibility which may be obtained with the multi-purpose weapons. Payoff functions, models for effectiveness and costs are presented. The principal example used--is the multi-purpose missile to be used for air-to-air and air-to-ground combat in limited war. Principles of the method are abstracted and are applied to a multi-purpose tactical aircraft. (Author)

AD-285 249 Div. 12
(TISTW/RD) OTS price $5.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
THE STUDY OF ELECTROMAGNETIC TECHNIQUES FOR SPACE NAVIGATION.
Quarterly Progress rept. no. 10, 16 May-15 Aug 62, by R. G. Franklin and D. L. Birx. 15 Aug 62, 47p. incl. illus. tables, Rept. no. Q-A2415-10)
(Contract AF 33(616)7244, Proj. 0(610)4427
Unclassified report

DESCRIPTORS: *Space navigation, *Celestial navigation, Sun, Noise, Templates, Signal-to-Noise Ratio, Spectrographic analysis, Electromagnetic waves.

The comparison of template tests showed a reduction in dispersion will not adversely affect the S/N ratio provided that the widths of the spectral lines are reduced in proportion to the dispersion. Although 500 wobbulation is effective in reducing noise, instabilities in the mirror driver unit have prevented reliable operation at this frequency. Tests have been carried out with two methods of detection at 10c. Results showed the standard technique of matching alternate 20c peaks is superior to a phase detection method working only with the 10c signal. Data analysis showed the average uncertainty in velocity measurement at 10c is 164 m/sec. Fabrication of the stellar spectrograph is proceeding. (Author)

AD-285 262 Div. 12
(TISTA/SEB) OTS price $5.60

Michigan U., Ann Arbor.
RENDEZVOUS IN ELLIPTICAL ORBITS.
Report on Research Project,
by Charles B. Humphreys. Aug 62, 43p. incl. illus.
Unclassified report

DESCRIPTORS: *Satellite rendezvous vehicle, *Theses, Satellite vehicle trajectories, Thrust, Equations, Motion, Interception probabilities, Interception, Maneuverability, Flight paths.

A study is made of the rendezvous of a commuter with a target which is in an established elliptical orbit. The commuter has received its main boost and has arrived in the vicinity of the target with errors in position and velocity. The rendezvous is accomplished with two impulses, one initially and the second, at interception to reduce the relative velocity to zero. Use is made of adjoint equations with the linearized equations of relative motion to calculate the required initial impulse. For given target and commuter conditions, this technique depends only on the time chosen to effect rendezvous. Trial and error solutions are not necessary to find the commuter trajectory (based on the linearized equations) from an initial position to the target. Two cases are considered, one with the commuter trajectory in the target orbit plane, and the other out of the plane. Twelve different times to effect rendezvous are considered in each case. The accuracy is checked by calculating actual trajectories using both the linearized and exact equations of relative motion. (Author)

AD-285 270 Div. 12, 15
(TISTA/SEB) OTS price $11.00

North American Aviation, Inc., Downey, Calif.
PROGRAM FOR DETERMINING THE THERMAL ENVIRONMENT AND TEMPERATURE HISTORY OF ORBITING SPACE VEHICLES.
Report on Space Vehicle Thermal and Atmospheric Control Study,
by Gary A. McCue. 7 Mar 62, 125p. incl. illus. tables, 6 refs. (Rept. no. SID 62-313)
(Contracts AF 33(616)7635 and AF 33(616)8323, Proj. 6146)
(ASD TN 61-83) Unclassified report

DESCRIPTORS: *Satellite vehicles, *Space environmental conditions, *Surface temperatures, Surfaces, Mathematical prediction, Programming, Computers, Solar energy, Thermal radiation, Thermionic emission, Secondary emission, Heat, Tables, Vector analysis, Surface properties, Temperature, Simulation.

An IBM 7090 program was developed to simulate the thermal environment of a stabilized multisurfaced space vehicle in any earth orbit. Vector notation has been employed to provide simplified methods of handling the complicated geometrical configurations inherent to this problem. As a consequence, it is relatively simple to compute formfactors for direct solar, earth emission, and reflected solar radiation incident upon each vehicle surface at various intervals around the orbit. Output includes tables of form factors, surface temperatures, external heat loads, and incident radiation as a function of true anomaly and time. The program is very efficient and will compute the above data for a typical 12-sided orbiting vehicle in about 15 seconds. Five sample problems are presented to illustrate how one might utilize this program to predict the performance of several representative vehicles performing typical missions. Descriptions of recent program modifications which simplify usage and provide increased versatility are incorporated. (Author)

AD-285 271 Div. 12, 15
(TISTA/SEB) OTS price $11.50

Aero-Space Labs., North American Aviation, Inc., Downey, Calif.
PROGRAM FOR DETERMINING TEMPERATURES OF ORBITING SPACE VEHICLES.
Report on Space Vehicle Thermal and Atmospheric Control Study,
by Gary A. McCue. 20 Apr 61, 157p. incl. illus. tables, 4 refs. (Rept. no. SID 61-105)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Space environmental conditions, *Surface temperatures, Surfaces, Mathematical predictions, Programming, Computers, Solar energy, Thermal radiation, Secondary emission, Heat, Tables, Vector analysis, Surface properties, Temperature, Simulation.

AD-285 358 Div. 12
(TISTW/RD) OTS price $2.60

Illinois U., Urbana.
ANALYSIS OF MISSILE LAUNCHERS. PART Q. TIPOFF EFFECTS IN HELICAL RAIL LAUNCHERS.
Rept. on Dynamics of Missile Launchers,
by Wesley Hosken. Sep 62, 19p. incl. illus. (T & AM rept. no. 223)
(Contract DA 11-070-508-ORD-593, Proj. 517-01-002)
Unclassified report

DESCRIPTORS: *Guided missile launchers, Equations, Motion, Moments, Mathematical analysis.

An analysis is presented of the motion of a four-rail helical launcher system including tipoff, i.e., the conditions when the front shoes leave the launcher but the rear shoes remain in contact with the guidance rail. The launcher is allowed three degrees of freedom (pitch, yaw, and roll). (Author)

AD-285 397 Div. 12, 4
(TISTM/SJR) OTS price $2.60

Naval Propellant Plant, Indian Head, Md.
SYNTHESIS AND PROPERTIES OF SOME CYANURIC CHLORIDE DERIVATIVES,
by M. S. Chang and A. J. Matuszko. 11 May 62, 20p. incl. tables, 35 refs. (Technical rept. no. 116)
(NAVWEPS rept. no. 7109) Unclassified report

DESCRIPTORS: *Propellants, *Cyanogen chlorides, *Triazines, Nitro radicals, Alcohols, Halogen compounds, Esters, Cyanuric acid, Synthesis.

Cyanuric chloride was reacted with several negatively substituted primary alcohols. Completely substituted reaction products were obtained with trifluoroethanol, tribromoethanol, pentaerythritol trinitrate, and pentaerythritol dinitrate. Di- and tri-substituted products were obtained with 2-methyl-2-nitro-1-propanol which has a tertiary nitro group, whereas alcohols with primary and secondary nitro groups did not react. The reaction with the potassium salt of nitroform gave a product which gradually decomposed on standing. The monoperchlorate salt of trihydrazino-s-triazine was obtained, but attempts at the preparation of perchlorate derivatives of aminoazido-s-triazines were unsuccessful. Sensitivity and stability data are reported on some of the products. (Author)

AD-285 411 Div. 12
(TISTW/RD) OTS price $2.60

Space Technology Labs., Inc., Redondo Beach, Calif.
PARAMETER ESTIMATION FOR CONTINUOUSLY MONITORED SYSTEMS,
by N. Kaufman. 23 July 62, 17p. (Rept. no. 6301-6280-KU-000)
(Contract AF 04(694)3)
(BSD TDR 62-168) Unclassified report

DESCRIPTORS: *Guided missiles (Surface to surface), *Reliability, Monitors, Failure (Mechanics), Feasibility studies, Mathematical analysis, Statistical analysis.

The determination of weapon system capability requires the estimation of certain system parameters such as equipment failure rate, personnel error propensity, and test coverage. This study is concerned with the feasibility of measuring these parameters for systems whose status is continuously monitored, such as is characteristic of certain portions of the Atlas weapon system. The investigation proceeds via the analysis of these system models, which successively reduce the restrictions as to possible system states, and formulas are derived for the specified parameters in each case. (Author)

AD-285 516 Div. 12
(TISTW/RD) OTS price $3.60

RCA Service Co., Inc., Patrick Air Force Base, Fla.
ACCURACY OF SINGLE STATION TRACKING.
Final rept.,
by Pieter S. Dubbeldam. 22 Feb 62, 41p. incl. illus. tables, 5 refs. (Systems Analysis Technical Documentary rept. no. 22)
(Contract AF 08(606)3413)
(MTC TDR 62-9) Unclassified report

DESCRIPTORS: *Guided missile tracking systems, *Satellite vehicles, *Doppler tracking, Radar tracking, Position finding, Errors, Analysis of variance, Velocity, Mathematical analysis, Least squares method, Tracking.

The accuracy is described that can be expected in tracking a missile in unpowered flight by means of a single station, in a specified geometric

configuration. The single station consists of either a UDOP station or a telemetry dish, or the combination of both. The tracking method rests on the calculation of the orbit parameters. A least squares analysis was employed to find the errors in position and velocity relative to a local coordinate system for several values of the input errors; the errors in the orbit parameters are obtained as an intermediate step. The results show that the errors are very large when pure doppler data are used due to degeneracy caused by the geometric configuration. The data from the telemetry dish, although less accurate than the doppler data, give much better accuracy, because the phenomenon of degeneracy is absent. Combination of the two sets of data removes the degeneracy of the doppler data to a large degree and promises a satisfactory solution to the tracking problem. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-284 912 Div. 13, 22
(TISTM/SJH) OTS price $12.00

National Engineering Science Co., Pasadena, Calif.
EXPERIMENTAL STUDY OF THE EFFECTS OF REPEATED BLAST LOADINGS ON STRUCTURAL ELEMENTS,
by R. T. Eppink, L. B. McCammon and others.
May 62, 152p. incl. illus. tables. Rept. no. P-166-10)
(Subcontract to Lockheed Aircraft Corp., Sunnyvale, Calif., Contract NOrd-17017)
Unclassified report

DESCRIPTORS: *Structures, *Blast, *Stresses, *Atomic bomb damage; Atomic bomb explosions, Simulation, Loading, Steel, Failure (Mechanics), Theory, Test methods, Test equipment.

An experimental study of the behavior of various structural elements subjected to repeated dynamic loadings is reported. The purpose of the investigation was to provide experimental evidence leading to a fuller understanding of the behavior of building structures which are exposed more than once to the blast waves of a nuclear explosion. The specimens tested include pinned and fixed-base rigid frames and portal-frame knee connections. All loadings, both static and dynamic, were applied by the atomic blast simulator at the U. S. Naval Civil Engineering Laboratory. The test results are presented and a comparison is made with analytical calculations based on a simple structural theory. It was concluded from this comparison that the elementary theoretical procedures employed are adequate when applied to damage assessment studies. (Author)

AD-285 349 Div. 13, 31
(TISTB/MS) OTS price $14.00

Syracuse U. Research Inst., N. Y.
ADDITIVES TO IMPROVE THE FIRE FIGHTING CHARACTERISTICS OF WATER.
Final rept.,
by A. R. Aidun and C. S. Grove, Jr. 31 Dec 61, 148p. incl. illus. tables (Rept. no. Ch. E. 504-6112F)
(Contract NBy 13027)
Unclassified report

DESCRIPTORS: *Water, *Fires, *Fire extinguishers, Additives, Tests, Effectiveness, Viscosity, Control.

Chemical additives were tested which could change the nature of water and improve its effectiveness as a fire fighting medium for Class A fires. The results showed the validity and feasibility of the concept of chemical additives to improve the effectiveness of water as a Class A fire extinguisher. Since a large portion of this improvement was shown to be due to viscosity additives, the study of opacifiers was suspended, in order to concentrate efforts and experimental work on the viscosity study. (Author)

AD-285 503 Div. 13
(TISTE/CAM) OTS price $8.60

Structural Mechanics Research Lab., U. of Texas, Austin.
REVIEW OF DATA FROM LATERAL THRUST LOADINGS ON PILES.
Final rept.,
by Lymon C. Reese, Hudson Matlock and others.
1 May 62, 98p. incl. illus. tables, 24 refs.
(Contract NBy-32192)
Unclassified report

DESCRIPTORS: *Beams, *Structures, Load distribution, Deflection, Deformation, Elasticity, Soils, Sand, Clays, Analysis, Differential equations, Model tests, Measurements, Experimental data, Stresses.

The deflections and stresses in a laterally loaded foundation pile are a consequence of complex interaction among the structure, the pile, and the supporting soil. Correlations are needed to enable reliable prediction of force-deformation characteristics (p-y curves) from the results of soil tests. Data were organized in chronological form and were carefully screened for information on which to base the needed correlations. Pertinent data from instrumented pile tests were evaluated for accuracy and validity. Attempts were made to apply reasonable corrections or estimates. Final evaluation of resulting p-y curves was limited by the need for soil-test data representative of the condition of the soil. Lateral-plate-bearing tests produce results which appear to be reasonably valid. (Author)

14. MATERIALS (NON-METALLIC)

AD-284 551 Div. 14
(TISTM/REB) OTS price $.75

Armour Research Foundation, Chicago, Ill.
MECHANISM OF WEAR OF NONMETALLIC MATERIALS.
Summary rept., Jan-Oct 61 on Surface and Interface Phenomena of Matter,
by C. H. Riesz and H. S. Weber. June 62, 21p. incl. illus. tables, 24 refs.
(Contract AF 33(616)6920, Proj. 7022)
(WADC TR 59-316, pt. 4)
Unclassified report

DESCRIPTORS: *Friction, *Sapphires, Theory, Crystal structure, Surface properties.

Friction and wear of single-crystal sapphire surfaces were studied at 10 to the -6th power mm Hg over a temperature range of 25 to 1550 C. Highest coefficients of friction were found at ambient temperature, particularly when basal planes were in sliding contact. Under certain conditions fracture tracks were produced. Orientation dependence was observed up to approximately 1300 C. Friction-related basal dislocations were detected at temperatures as low as

600 C. A proposed mechanism of friction and wear suggests that 2 types of frictional junctions are formed. At ambient temperature the junctions are adhesive in nature, highly orientation dependent, and related to surface phenomena. At elevated temperature friction is only slightly influenced by orientation, and plastic deformation, based mainly on the highly active basal slip system, leads to 'weld-junctions' and flow in bulk. The relative contributions of the two types of junctions provide anomalous coefficients of friction for sapphire at or around 600 C both under vacuum and in air. (Author)

AD-284 552 Div. 14
(TISTM/ODN) OTS price $2.60

Aerojet-General Corp., Azusa, Calif.
STUDY OF THE EFFECTS OF THICKNESS ON THE PROPERTIES OF LAMINATES FOR UNDERWATER PRESSURE VESSELS.
Quarterly rept. no. 1, 15 Feb-15 May 62,
by R. D. Saunders, R. L. Smith, and F. E. Brown.
May 62, 18p. 6 refs. (Rept. no. 0623-01-4)
(Contract NObs-86406)
Unclassified report

DESCRIPTORS: *Underwater, *Pressure vessels, *Laminates, *Plastics, Mechanical properties, Physical properties, Reinforcing materials, Materials, Stresses, Analysis, Filament-wound construction, Design, Thermal stresses, Temperature, Heat, Tests, Resins, Thickness.

The basic purpose was to study the effects of thickness on the mechanical and physical properties of fiber-reinforced plastic laminates for deep submersible external pressure vessels. A preliminary analysis of fabrication and test methods is given. The method of fabrication of several test base cylinders is outlined. An analysis of the effects of filament tensioning, and the method for derivation of a tension pattern for a thick-wall cylinder, that will achieve a theoretically uniform stress-distribution across the laminate wall when externally loaded, are presented. Selection of materials for fabrication of cylinders is shown. (Author)

AD-284 561 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
PROCESS - REPAIR - GOLD PLATED GLASS REINFORCED PLASTIC - EVALUATION OF,
by W. L. Armstrong. 29 Aug 62, 10p. incl. illus. tables (Rept. no. FTDM-2060)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Plastics, *Maintenance, *Glass, *Reinforcing materials, Laminates, Adhesion, Plating, Solutions, Surfaces, Materials, Test equipment, Test methods, Gold plating.

The results of visual inspections and adhesion tests on gold platings produced by various repair techniques are presented. Gold plated Class III laminates may be successfully repaired with the repaired areas exhibiting an appearance and plating adhesion comparable to the original platings. (Author)

AD-284 632 Div. 14
(TISTM/ODN) OTS price $1.60

Narmco Industries, Inc., San Diego, Calif.
POTENTIAL OF FILAMENT WOUND COMPOSITES.
Monthly progress rept. no. 16, 1-31 Aug 62,
by W. H. Otto and D. Stevens. Aug 62, 11p. incl. illus.
(Contract NOw 61-0623-c)
Unclassified report

DESCRIPTORS: *Composite materials, *Filament wound construction, Glass textiles, Tensile properties, Epoxy resins, Coatings, Stresses, Temperature, Theory, Deformation, Tests, Humidity, Test equipment, Fatigue (Mechanics), Rupture, Reinforcing materials.

Measurements of the effect of tension on monofilament during resin cure are reported for fiber stress from 36,000 psi to 160,000 psi. Tests on the effects of humidity cycling of epoxy coated single E-glass fibers were completed and the results are reported. The static fatigue studies on virgin E-glass fibers coated with epoxy resin were completed. The results are reported for temperatures up to 600 F and load durations up to 10 min. A method of experimentally confirming the derived biaxial stress-strain equations is described along with an apparatus for making bending and twisting load-deflection tests. A device constructed to make biaxial stress-strain and photoelastic tests is described. (Author)

AD-284 674 Div. 14, 25, 20
(TISTM/EJH) OTS price $2.60

General Dynamics/Fort Worth, Tex.
COMPRESSION-SET BEHAVIOR OF IRRADIATED ELASTOMERS,
by E. G. Fritz and P. M. Johnson. Aug 62, 25p. incl. illus. tables, 3 refs. (Document no. NARF-62-10T; MR-N-296)
(Contract AF 33(657)7201)
Unclassified report

DESCRIPTORS: *Elastomers, *Radiation effects, *Vulcanizates, *Synthetic rubber, *Deformation, Fluorocarbons, Silicones, Polymers, Butadienes, Stresses, Copolymerization, Relaxation time, Mechanical properties, Fatique (Mechanics), Gamma rays, Neutrons.

The effects of mixed-field reactor radiation and pure gamma rays on the compression-set behavior of 3 types of elastomers (Viton A, Silicone LS-53, and Neoprene WRT) are analyzed. The available experimental data which originated at 2 different facilities and extended over 5 logarithmic decades of dose, are well describable by the empirical equation S sub D equals S sub 0 (S sub m - S sub 0) where S sub D equals percent compression set in air after absorption by the sample of dose D (ergs/gm(C)) S sub 0 equals percent compression set in air of unirradiated sample, S sub m equals maximum compression set in air as D approaches infinity X equals exp (A + B log D + C log D to the 2nd power), where A, B, C equal material constants. The results of the analysis are discussed. (Author)

AD-284 777 Div. 14, 25
(TISTM/ODN) OTS price $8.60

American Meteorological Society, Boston, Mass.
THE MECHANICAL PROPERTIES OF ICE (Mekhanicheskie svoistva l'da),
by K. F. Voitkovskii. Aug 62, 92p. incl. illus. tables (Trans. no. T-R-391 from Voitkovskii, K. F. Mekhanicheskie svoistva l'da, Moscow, Izd. Akademii Nauk SSSR, 100p. 1960)
(Contract AF 19(604)6113; In cooperation with The Arctic Institute of North America, Contract AF 19(604)8343)
(AFCRL 62-838) Unclassified report

DESCRIPTORS: *Ice, *Mechanical properties, Structures, Physical properties, Impurities, Deformation, Single crystals, Elasticity, Shear stresses, Creep, Stresses, Viscosity, USSR, Experimental data, Literature.

Ice is widely used as a construction material for ice storehouses, ice causeways and the like and for ice crossings and ice roads. Further, it is used to combat aridity. Studies of the physical and mechanical properties of ice were made and extensive data appeared in the special literature, but it is difficult to make practical use of this information because the quantitative parameters of the mechanical properties show large discrepancies. For example, the ultimate compressive strength of ice found by testing ice samples may vary by a factor of ten or more. Data on the plastic properties of ice reveal greater discrepancies. The need has arisen to analyze and generalize these data, to attempt to explain the reasons for the large discrepancies in the various parameters, to establish the laws of their change and to find the most reliable characteristics of the mechanical properties. The present report is devoted to the solution of these problems. It is based on a generalization of the data in the literature on the properties of ice and on the experimental work of the author on studies of the plastic properties of ice. (Author)

AD-284 785 Div. 14, 4
(TISTM/REB) OTS price $2.60

Frick Chemical Lab., Princeton U., N. J.
THE VISCOELASTIC PROPERTIES OF CROSSLINKED POLY(ETHYLENE TETRASULFIDE). III,
by A. V. Tobolsky, R. B. Beevers, and G. D. T. Owen. Aug 62, 10p. illus. tables, 12 refs.
(ONR technical rept. no. RLT-49)
(Contract Nonr-185807, Proj. NR 356-377)
Unclassified report

DESCRIPTORS: *Polymers, *Ethylenes, *Sulfides, *Viscosity, *Elasticity, Chlorides, Propanes.

The viscoelastic properties of poly(ethylene tetrasulfide) containing 5% of the crosslinking agent 1,2,3, trichloropropane, have been examined over a wide temperature range, especially in the transition region. This extends the work previously reported on the preparation of crosslinked poly(ethylene tetrasulfides) and their properties in the region of chemical stress relaxation. From the relaxation curves the master curve has been constructed and the first and second approximation to the distribution of relaxation times evaluated. The data has been found to fit quite satisfactorily to a modified Williams-Landel-Ferry type equation. Apparent activation energies have been evaluated and show a marked temperature dependence with peak value of 207 k cals/mol at -17 C. It is interesting that a polymer which contains mainly sulfur atoms along its main chain has viscoelastic properties in the transition region which are very similar to completely organic polymers. (Author)

AD-284 839 Div. 14, 31
(TISTM/ODN) OTS price $4.60

Aerojet-General Corp., Azusa, Calif.
STUDY OF THE EFFECTS OF THICKNESS ON THE PROPERTIES OF LAMINATES FOR UNDERWATER PRESSURE VESSELS.
Quarterly rept. no. 2, 15 May-1 Sep 62,
by R. D. Saunders, R. L. Smith and F. E. Brown. Sep 62, 46p. incl. illus. tables. (Rept. no. 0623-01-2)
(Contract NObs-86406)
Unclassified report

DESCRIPTORS: *Plastics, *Laminates, *Pressure vessels, *Underwater, Thickness, Reinforcing materials, Fibers, Analysis, Manufacturing methods, Polymers, Test methods, Hydrostatic pressure, Physical properties, Stresses, Design, Tests, Microphotography, Shear stresses, Resins, Rings, Mechanical properties.

The effects of thickness on the mechanical and physical properties of fiber-reinforced plastic laminates for deep submersible external pressure vessels are studied. An analysis of fabrication methods and problems related to thick-walled cylinders is given. Methods of testing and test results of cylinders and rings are presented. (Author)

AD-284 858 Div. 14, 8
(TISTM/REB) OTS price $1.60

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
EVALUATION OF MARKING INKS FOR ELECTRONIC EQUIPMENT,
by A. O. Stander. 5 Sep 62, 9p. tables (Rept. no. NAMC AML 1518)
(WEPTASK no. RRMA 04 013/200 1/R001 02 01)
Unclassified report

DESCRIPTORS: *Ink, *Electronic equipment, Military requirements, Adhesion, Abrasion, Resin, Fungus deterioration.

Data are presented on the adhesion, abrasion resistance, and resistance to fungus attack of marking inks formulated from various resin classes intended for use on aircraft and missile electronic equipment. These were applied to numerous substrates. The marking requirements of aircraft and missile electronic equipment specifications were also reviewed for any needed revisions. (Author)

AD-284 868 Div. 14
(TISTM/ODN) OTS price $1.60

Smith, A. O., Corp., Milwaukee, Wis.
GLASS SURFACE CHEMISTRY FOR GLASS FIBER REINFORCED PLASTICS.
Monthly progress rept. no. 6, 1-31 Aug 62 on Effect of Glass Surface Chemistry on Wetting, Bond Strength and Bond Life of an Epoxy Resin.
15 Sep 62, 12p. incl. illus. tables, 6 refs.
(Contract NOw 62-0679-c)
Unclassified report

DESCRIPTORS: *Plastics, *Laminates, *Glass textiles, Surfaces, Glass, Resins, Epoxy resins, Coatings, Bubbles, Water, Air, Surface properties.

The results of wetting studies to voids in laminates are presented. A likely origin of gas voids in laminates is the air bubbles entrained during application of resin to the glass fibers. Results showed there was more probability of trapping air bubbles on the A-1100 treated E glass surface in epoxy resin than on the chemically cleaned surface. The A-1100 treated glass surface was known to be more poorly wet by water and epoxy resin. It is probable that the void content of a laminate might be reduced by more complete wetting of the glass surface by the resin. Further investigations of mode of failure in the flat plate test indicated that 190 F water permeated through resin and along the glass-resin interface at equal rates. Both mechanisms removed resin coatings from untreated chemically cleaned glass surfaces in 15 hours or less. The problem of poor reproducibility in bond strength measurements was partly solved by changing the alignment fixture. The specimens were being stressed prior to testing. The question of location of failure when mirror interfaces result was partly answered by captive bubble measurements. The failed bond areas exhibited marked non-wetting by water, thereby indicating resin was left on the glass surface. (Author)

AD-284 915 Div. 14
(TISTM/REB) OTS price $4.60

General Dynamics/Fort Worth, Tex.
ULTIMATE AND PSEUDO-EQUILIBRIUM TENSILE PROPERTIES OF IRRADIATED ELASTOMERS,
by E. G. Fritz and P. M. Johnson. Aug 62, 43p. incl. illus. tables, 5 refs. (Document no. NARF-62-9T; Rept. no. MR-N-295)
(Contract AF 33(657)7201)
Unclassified report

DESCRIPTORS: *Elastomers, *Vulcanizates, Radiation effects, Stresses, Silicones, Polymers, Urethanes, Rubber, Synthetic rubber, Mechanical properties, Tensile properties.

It is shown that the pseudo-equilibrium stress-strain behavior and ultimate strength of a number of commercially prepared and reactor-irradiated vulcanizates (silicones, polyurethanes, natural rubber, NR-neoprene, and NR-SBR blends) follow, in good approximation, the empirically developed relationship tau/(2(alpha-alpha to the minus 2nd power)) equals CD to the A power, where tau is the stress or ultimate tensile strength in psi (with reference to the undeformed cross section) at extension ratio alpha, D is the absorbed dose in megarads, and C and A are constants. In the cases investigated, A varied from near zero to 0.5. This relationship is compared with a similar expression developed by Charlesby et al (The Rheology of Elastomers, pp. 129-149, Pergamon Press, 1958), and with the Andrade creep function. (Author)

AD-284 945 Div. 14
(TISTM/TCG) OTS price $2.25

Brush Beryllium Co., Cleveland, Ohio.
INVESTIGATION OF INTERMETALLIC COMPOUNDS FOR VERY HIGH TEMPERATURE APPLICATIONS.
Interim rept., 1 Nov 60-31 Dec 61 on Refractory Inorganic Non-metallic Materials,
by Jonathan Booker, Robert M. Paine, and A. James Stonehouse. July 62, 82p. incl. illus. tables, 21 refs.
(Contract AF 33(616)6540, Proj. 7350)
(WADD TR 60-889, pt. 2)
Unclassified report

DESCRIPTORS: *Refractory materials, *Intermetallic compounds, *Tantalum compounds, *Beryllium compounds, *Zirconium compounds, *Tungsten compounds, Silicides, Oxidation inhibitors, Thermal stresses, Impact shock, Fracture (Mecnanics), Oxidation, Reaction kinetics, Vapor pressure, Theory, Thermal conductivity, High temperature research, Physical properties.

Three areas were studied in a continuing investigation of intermetallic beryllides and silicides for very high temperature applications. The measured properties of Ta2Be17 were unaffected by minor variations in stoichiometry between 800 and 3000 F, whereas best results for WSi2 were obtained with a material slightly deficient in W. WSi2 exhibited poorest oxidation resistance at 2200 F. Results are reported for oxidation-rate studies on TaBe12, Ta2Be17, ZrBe13, and Zr2Be17 in the temperature range from 2300 to 2750 F. The vapor pressures for these same compounds were measured between 2300 and 2650 F, using the Knudsen cell technique. For TaBe12 the activation energy for oxidation is lower than the vaporization energy in this temperature range. The oxidation products of Zr2Be17 were ZrBe5 and BeO. Ternary systems of Be and Si with Mo, Nb, Ta, W, or Zr were studied. The most promising was a mixed-phase preparation with the stoichiometry of MoBeSi, which exhibited less than 2 mils penetration when oxidized in air at 3000 F for 10 hr. (Author)

AD-284 982 Div. 14, 22, 20
(TISTM/EJH) OTS price $3.60

Feltman Research Lab., Picatinny Arsenal, Dover, N. J.
PLASTIC MATERIALS IN LIGHTWEIGHT NEUTRON SHIELDS: GENERAL THEORY AND PRACTICE,
by J. J. Begley. Aug 62, 38p. incl. illus. tables, 15 refs. (Picatinny Arsenal technical rept. no. 3009)
Unclassified report

DESCRIPTORS: *Shielding, *Plastics, Materials, Nuclear explosions, Armor, Neutron capture, Polymers, Ethylenes, Resins, Elastomers, Hydrogen, Density, Gamma emission, Lithium, Boron, Manufacturing methods, Casting, Neutrons.

A quick, simplified review is presented of the neutron shielding process and general criteria for determining the relative effectiveness of various shielding materials are described. Among these criteria are hydrogen density, the presence of neutron-absorbing materials, and secondary gamma emitters. A graph is presented whereby the hydrogen density of a material can be rapidly determined. Various shielding materials and fabrication techniques are reviewed, with particular attention to the highly promising cast-in-place method. A list of the major resins and other plastic materials and their relative shielding values is presented. Inspection techniques are discussed as a quality control measure to ensure void-free sections. (Author)

AD-284 989 Div. 14, 8
(TISTM/EJH) OTS price $1.60

Synthetic Mica Co., West Caldwell, N. J.
ULTRA HIGH TEMPERATURE DIELECTRIC EMBEDDING MATERIALS.
Quarterly progress rept. no. 3,
28 Apr-27 July 62,
by Stanley Rodney. 27 July 62, 12p.
(Contract NObs-86219, Proj. R-007-04-01)
Unclassified report

DESCRIPTORS: *Embedding substances, *Encapsulation, *Glass seals, *Ceramic coatings, Dielectrics, Phosphates, Mica, Glass, Electric insulation, Electronic equipment, High temperature research, Manufacturing methods.

A glass was developed which has the same devitrification properties and better resistance to reduction than the commercially available type used previously. The optimum devitrification temperature of the glass was found to be between 550 C and 600 C. Fluidized bed operation was found to be most efficient using glass particles in the size range between 75 microns at the upper limit and 45 microns at the lower limit. The fluidized bed technique leads to a coating thickness which is uniform to ±10%. (Author)

AD-285 029 Div. 14, 25, 30
(TISTM/EJH) OTS price $11.00

Chesapeake Instrument Corp., Shadyside, Md.
DYNAMIC MECHANICAL PROPERTIES OF MATERIALS FOR NOISE AND VIBRATION CONTROL. VOLUME II,
by Edward J. Cook, John A. Lee, and Edwin R. Fitzgerald. 1 July 62, 133p. incl. tables, refs.
(Technical rept. no. 2; CIC rept. no. 187)
(Contract Nonr-267800)
Unclassified report

DESCRIPTORS: *Vibration isolators, *Insulating materials, *Acoustic insulation, *Noise, Acoustics, Vibration, Damping, Plastics, Polymers, Butadienes, Acrylonitriles, Urethanes, Resins, Resin adhesives, Tables.

Shear characteristics presented in various tables include frequency; storage compliance J; loss compliance J J; loss tangent, J J/J; storage modulus; loss modulus; shear velocity; and attenuation. Materials studied include: polyisobutylenes, butadiene-acrylonitrile copolymers, miscellaneous materials such as damping materials, polyurethane, adhesives.

AD-285 062 Div. 14
(TISTM/TCG) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
MEASUREMENT AND CONTROL OF MOISTURE IN MOLDED EXPANDABLE POLYSTYRENE,
by Peter J. Mihalik. Sep 62, 21p. incl. illus. (Technical rept. no. 3033)
Unclassified report

DESCRIPTORS: *Expanded plastics, *Moisture, *Measurement, *Polymers, *Styrenes, Test methods, Moisture meters, Ammunition, Packaging, Military requirements, Specification, Control, Physical properties.

Two methods, solvent extraction and Karl Fischer, were investigated as means of measuring the moisture content of molded expandable polystyrene for use in Army Ordnance ammunition packaging. Both methods were satisfactory and gave results which were in agreement. The maximum allowable moisture content for molded expandable polystyrene was established. This moisture content is recommended for adoption in packing drawings and purchase specifications. A small sample inspection plan from MIL-STD-105B is also recommended for adoption. (Author)

AD-285 091 Div. 14, 27
(TISTM/EJH) OTS price $1.10

High Temperature Materials, Inc., Boston, Mass.
DEVELOPMENT OF BORON PYRALLOY FOR ROCKET MOTOR HARDWARE.
Monthly progress rept. no. 6, 6-31 Aug 62. 26 Sep 62, 5p. incl. table.
(Contract NOw 60-0292)
Unclassified report

DESCRIPTORS: *Refractory materials, *Boron compounds, *Rocket motor nozzles, Rocket motors, Tensile properties, Mechanical properties, Elasticity, Thermal conductivity, Graphite compounds.

Measurements are reported for the two Young's moduli and the 3 Poisson's ratios that characterize the elastic behavior of this transversely anisotropic material. Tensile test results signified an expansion in the 'a' direction at right angles to the direction of the applied tensile stress in the 'a' direction; 'c' direction contraction was of almost the same magnitude as the 'a' direction tensile strain. Thermal conductivity in the 'c' direction was measured for one sample of Boron Pyralloy between 188 and 1232 F. The wt% of B content in samples taken from 3 tensile test specimens was 1.22, 1.41 and 0.53 for the tensile strengths (psi) 23,200, 18,970, and 20,300 respectively.

AD-285 147 Div. 14, 26, 12
(TISTM/EJH) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - HONEYCOMB CORE - GLASS FIBER REINFORCED - OPTIMUM POSTCURE - TO DETERMINE,
by J. M. Warren. 10 Sep 62, 8p. incl. illus. tables (Rept. no. FTDM-1723)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Honeycomb cores, *Glass textiles, *Sandwich panels, Aging, Tensile properties, Mechanical properties, Bonding, Adhesives, Aluminum, High temperature research, Manufacturing methods.

Test results indicated that postcuring of glass fiber core for a total time of three and one-half hours at 350 F produced a satisfactory cure cycle. When the core is postcured for five hours at 350 F it became quite brittle and difficult to splice.

AD-285 148 Div. 14, 30
(TISTM/EJH) OTS price $3.60

General Dynamics/Fort Worth, Tex.
MATERIAL - GLASS REINFORCED PLASTICS - COMPRESSION JIGS - EVALUATION OF,
by C. J. Kastrop. 10 Sep 62, 30p. incl. illus. tables (Rept. no. FGT-1735)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Laminates, *Plastics, Reinforcing materials, Standardization, Test equipment, Tests, Elasticity, Tensile properties, Mechanical properties, Failure (Mechanics), Composite materials, Test methods.

Presently used test procedures for determining compression strength of glass-reinforced laminates seem to have some advantages and some disadvantages. Therefore, comparative data was obtained from several test procedures to determine which one produces the most accurate and reproducible data with a minimum of test set-up and test time involved. Eight Conolon 506-81 laminates were fabricated and specimens for each test jig evaluation were cut at random from the 8 laminates to lessen the effect of variation between laminates on a single set of data. Three basic test jigs were evaluated: (1) Convair sheet metal jig; (2) LP-406b jig; and (3) ARTC-W-64 jig. In addition to the standard rectangular test specimens recommended for the LP-406b and ARTC W-64 jigs, a flared-end (modified) specimen was also evaluated for each of these jigs. The evaluation consisted chiefly of comparisons of type of failure, ultimate compressive strength, and modulus of elasticity (stress-strain curves) at room temperature and 500 F. (Author)

AD-285 149 Div. 14
(TISTM/REB) OTS price $8.10

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE - BLOOMINGDALE RUBBER CO. HT-424 - EVALUATION OF,
by J. M. Warren and J. E. Thomas. 10 Sep 62, 77p. incl. tables, 9 refs. (Rept. no. FGT-1957)
(Contracts AF 33(657)7248 and AF 33(600)36200)
Unclassified report

DESCRIPTORS: *Adhesives, Military requirements, Tests, Creep, Rupture (Mechanics), Aging, Mechanical properties.

Tests were conducted to evaluate HT-424 as a second source of Convair specification FMS-0015(D) adhesive. (Author)

AD-285 151 Div. 14
(TISTM/TCG) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE - EXPERIMENTAL, BLOOMINGDALE RUBBER CO., DETERMINATION OF CURE CYCLE FOR EVALUATION OF STRENGTH,
by Floyd DeLeon, Jr. 13 Sep 62, 15p. incl. illus. tables (Rept. no. FTDM-2346)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Films, *Sealing compounds, Feasibility studies, Storage, Bonding, Shear stresses, Heat treatment, Stability, Aging, Aluminum alloys, Glass textiles.

Research was conducted to investigate the suitability of Bloomingdale Rubber Company's experimental film and paste as repair adhesives, evaluate the storage properties of the paste material designated B-58 Experimental Repair Putty, and to determine the optimum compatible cure cycle for the film and paste adhesives. (Author)

AD-285 153 Div. 14
(TISTM/TCG) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL: PUTTY, INSULATING, HIGH TEMPERATURE RESISTANT, FRESCO FR0020, THERMAL AND PHYSICAL PROPERTIES OF,
by H. H. Chandler and F. Hancock. 28 Aug 62, 9p. incl. illus. tables (Rept. no. FTDM-2435)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Thermal insulation, *Materials, *Sealing compounds, Thermal conductivity, Specific heat, Gravity, Adhesion, Aluminum alloys, Steel, Hardness, Fluids, Alloys, Physical properties, High temperature research, Adhesives.

The following thermal and physical properties were determined for Fresco FR0020 putty: (1) Thermal conductivity, (2) Specific gravity, (3) Specific heat, (4) Adhesion in tension to 2024 aluminum and 18-8 steel per FMS-0047, and (5) Hardness and weight change on exposure to various fluids. (Author)

AD-285 154 Div. 14
(TISTM/TCY) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE - STRENGTH AT -67 F - AF-31 LAP SHEAR - EFFECT OF INCREASED GLUELINE THICKNESS,
by R. L. Miller. 18 Sep 62, 9p. incl. tables.
(Rept. no. FTDM-2464)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Films, Bonding, Thickness, Shear stresses, Stability, Aluminum alloys, Adhesion, Low temperature research.

Tests were made to determine the effect of doubling the bonded glueline thickness on the -67 F lap shear and on the 80 F peel strengths of AF-31 dry film adhesive. (Author)

AD-285 155 Div. 14, 25
(TISTM/TCG) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - SOUND ABSORBING - COEFFICIENTS OF ABSORPTION - DETERMINATION OF,
by K. C. Christiansen. 28 Aug 62, 8p. incl. tables (Rept. no. FTDM-2532)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Materials, *Acoustics, *Absorption, Glass textiles, Rubber, Laminates, Asbestos fiber, Foams, Air conditioning equipment, Foam rubber, Expanded plastics.

Materials tested in determining the absorption coefficients included the following: fiberglas, rubber, felt, laminated fiberglas, asbestos and gasket material. (Author)

AD-285 156 Div. 14
(TISTM/TCG) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - FMS-0076 STRUCTURAL POTTING COMPOUND - BONDING CADMIUM PLATED AND EPOXY PRIMED STEEL WITH,
by R. L. Miller. 18 Sep 62, 8p. incl. illus. tables (Rept. no. FTDM-2438)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Thermal insulation, *Foams, *Sealing compounds, Bonding, Adhesives, Adhesion, Primers, Epoxy resins, Cadmium plating, Steel, Shear stresses.

The lap shear strength of Thermofoam 607 potting compound bonded to Cd plated and epoxy primed steel were compared. (Author)

AD-285 157 Div. 14, 1
(TISTM/TCG) OTS price $1.10

General Dynamics/Fort Worth, Tex.
FUSELAGE: GLASS (4B21163-2)-TB-58A INSTRUCTOR PILOT, FORWARD - BURST PRESSURE TEST,
by E. L. Trussell. 10 Sep 62, 5p. incl. illus.
(Rept. no. FTDM-2622)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Glass, *Airplane panels, Fuselages, Pressure, Tests, Failure (Mechanics), Stresses.

Tests were conducted to determine the zero-exposure burst strength of a 4B21163-2 instructor pilots forward glass panel at 260 F. (Author)

AD-285 158 Div. 14
(TISTM/TCG) OTS price $3.60

General Dynamics/Fort Worth, Tex.
MATERIAL - EPOXY RESIN BASED POTTING COMPOUNDS - EVALUATION OF,
by H. P. Owen. 1 Feb 62, rev. 14 May 62, 34p. incl. illus. tables (Rept. no. FGT-2921)
(Contract AF 33(657)7248 and AF 33(600)38975)
Unclassified report

DESCRIPTORS: *Epoxy resins, *Mechanical properties, *Heat treatment, Sealing compounds, Density, Shear stresses, Fracture (Mechanics).

Approximately 15 epoxy base potting compounds, consisting of both elevated and room temperature curing formulations, were obtained from several vendors. Specimens were prepared from the potting compounds and tested. Six of the elevated temperature curing materials tested appear suitable for use at both 77 and 260 F. These are REN 4030, Epocast 31-B and H-1310-1, Kish 312S and 422 and Filled Epon 828. (Author)

AD-285 160 Div. 14
(TISTM/EJH) OTS price $6.60

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE - HIGH TEMPERATURE RESISTANT, INVESTIGATION OF,
by J. E. Thomas. 10 Sep 62, 60p. incl. illus.
(Rept. no. FGT-1898)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Resin adhesives, *Bonding, High temperature research, Phenolic resins, Epoxy resins, Glass textiles, Nitrile rubber, Stainless steel, Titanium alloys, Aluminum, Shear stresses, Test methods.

The bond strengths of three commercial adhesives, AF-31, X-195 and X-131 on 2024T-3 clad aluminum, 17-7 PH Condition A stainless steel, and C-110 M titanium alloy were determined at various temperatures and conditions. When compared to similar adhesives in present use, the AF-31 adhesive was found to be superior in low and elevated temperature lap shear bond strength on 2024T-3 clad aluminum; and the X-195 and X-131 adhesives were found to be inferior in low and elevated temperature lap shear bond strength on 2024T-3 clad aluminum. (Author)

AD-285 166 Div. 14
(TISTM/ODN) OTS price $4.60

General Dynamics/Fort Worth, Tex.
TENSILE BEHAVIOR AND MOLECULAR CHARACTERISTICS OF IRRADIATED ELASTOMERS,
by E. G. Fritz and P. M. Johnson. July 62, 43p. incl. illus. tables, 4 refs. (Document no. NARF-62-8T; Rept. no. MR-N-294)
(Contract AF 33(657)7201)
Unclassified report

DESCRIPTORS: *Elastomers, *Tensile properties, *Radiation effects, Synthetic rubber, Urethanes, Polymers, Analysis, Tests, Theory, Silicones, Mechanical properties, Molecular weight, Radiation tolerance, Test equipment, Test reactors, Stresses, Density.

Stress-strain data on reactor-irradiated polyurethane elastomers were analyzed on the basis of the Mooney-Rivlin relationship. Good agreement of the experimental data with the theoretically predicted behavior is demonstrated. According to the molecular implications of this relationship, the total effective crosslinking density was calculated. The results indicate that, upon irradiation to doses on the order of 10 to the tenth power ergs/gm(C), all Adiprene-L and most Disogrin specimens preponderantly degraded while all Genthane and General Tire Type-R specimens preponderantly crosslinked. A supplementary preliminary analysis of stress-strain data of silicone elastomers via this approach showed, with few exceptions, a radiation-induced increase in the total effective crosslinking density. The limitations of the present analysis are discussed and recommendations are offered for the generation of additional and more refined experimental evidence to corroborate the conclusions of this analysis. (Author)

AD-285 202 Div. 14
(TISTM/ODN) OTS price $1.60

Vermont U., Burlington.
THE EFFECTS OF WATER ON THE STRENGTH OF LAMINATED PRESSURE VESSELS,
by John O. Outwater and Willard J. Seibert.
5 Oct 62, 10p. incl. illus. table (Technical memo. no. 194)
(Contract Nonr-321901, Proj. NRL 62 R05 19A)
Unclassified report

DESCRIPTORS: *Pressure vessels, *Water, *Laminates, Coatings, Humidity, Tests, Filament wound construction, Mechanical properties.

A series of pressure vessels was exposed to water, 100% relative humidity and humidity cycling both in their 'as wound' conditions and after they had been prestressed to 80% of their bursting load. The resulting final burst measurements were all subjected to a Student 't' test to determine the significance of the effects of water. It appears that a reduction of strength at the 0.95 significance level occurs only to specimens that have been preloaded to 80%, exposed to relative humidity 100% at room temperature for one week, or immersed in water for one week. One month's exposure to humidity cycling does not appear to reduce the strength significantly and there appeared to be no reduction in strength unless the vessel had been previously preloaded. (Author)

AD-285 214 Div. 14, 17, 27, 26
(TISTM/ODN) OTS price $2.60

Narmco Industries, Inc., San Diego, Calif.
TUNGSTEN TO GRAPHITE BONDING.
Final technical rept.,
by J. Ralph Armstrong and Roger A. Long.
30 Sep 62, 21p. incl. illus. tables.
(Contract DA 04-495-ORD-3028)
Unclassified report

DESCRIPTORS: *Tungsten, *Graphite, *Carbides, *Bonding, Tensile properties, Shock resistance, Thermal stresses, High temperature research, Materials, Processing, Manufacturing methods, Coatings, Alloys, Tungsten alloys, Vanadium alloys, Tests, Induction heating, Failure (Mechanics), Test equipment, Temperature, Mechanical properties, Thermal conductivity.

Tungsten to graphite carbide based bonds were evaluated as to tensile strength vs. temperature and thermal shock resistance. Tensile strengths varied from 530 psi at room temperature to 193 psi at 4000 F. No thermal shock failures were observed under the test conditions, 3500 F in ten seconds to a maximum temperature of 4425 F, followed by cooling to below red heat in 15 sec. The bonding procedure used for the data evaluation specimens had to be modified when the process was applied to the bonding of cylindrical tungsten inserts to segmented graphite backup structures. (Author)

AD-285 283 Div. 14, 25
(TISTM/ODN) OTS Price $.50

Northwestern U., Evanston, Ill.
EXCITATION PROCESSES IN CERAMICS AND THE ANOMALOUS INCREASE IN THERMAL CONDUCTIVITY AT ELEVATED TEMPERATURES.
Rept. for Jan 60-Jan 61 on Surface and Interface Phenomena of Matter,
by D. H. Whitmore. July 62, 10p. incl. illus. table, 16 refs.
(Contract AF 33(616)6194, Proj. 7022)
(WADD TR 60-866) Unclassified report

DESCRIPTORS: *Ceramic materials, *Thermal conductivity, Thermodynamics, Excitation, Titanium compounds, Calcium compounds, Aluminum compounds, Fluorides, Oxides, Crystals, Phonons, Temperature, Heat transfer.

The problem of the anomalous increase in the observed thermal conductivity of single-phase ceramics at high temperatures has been considered. At temperatures above the onset of this anomalous rise, account has been taken of the possibility that phonon, electronic, and radiative heat transfer, as well as transport of thermal energy by electron-hole pairs, excitons and dissociated gas molecules, may operate simultaneously and individually contribute significantly to the total heat flow. On the basis of reliable conductivity data on monocrystals of single-phase ceramics, estimations have been made on the magnitudes of these high-temperature components which reveal that excited states of low excitation energy may occur in certain ceramics. In these instances, such excited energy-carrying states are able to diffuse down the temperature gradient in the specimen thereby producing a non-negligible contribution to its observed thermal conductivity. (Author)

AD-285 284 Div. 14, 27
(TISTM/EJH) OTS price $2.75

National Carbon Corp., Cleveland, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS.
Progress rept. for 15 Oct 60-15 Oct 61 on Refractory Inorganic Non-Metallic Materials.
July 62, 131p. incl. illus. tables, 50 refs.
(Contract AF 33(616)6915, Proj. nos. 7350 and 7381)
(WADD TN 61-18, pt. 2)
Unclassified report

DESCRIPTORS: *Graphite, *Refractory materials, *Rocket motor nozzles, Carbon, Hydrocarbons, Benzenes, Coal tar, Pitch, Pyrolysis, Manufacturing methods, Fibers, Refractory coatings, Foams, Binders, Composite materials, Impregnation, Mechanical properties, Erosion, Crystal structures, Carbides, Silicon compounds, Spin, Resonance, Magnetic susceptibility, Electrons.

A review is given of activities over the period October 15, 1960 to October 15, 1961 on a three year United States Air Force - Department of Defense program for the research and development of materials, experimental techniques, and equipment for development of premium quality, reproducible graphite-base materials suitable for missile and astronautic applications. Progress is reported on research and development in the study areas of raw materials, fabrication, and material characterization and evaluation. (Author)

AD-285 285 Div. 14, 27
(TISTM/EJH) OTS price $1.60

General Electric Co., Evendale, Ohio.
HIGH STRENGTH GLASS FIBERS DEVELOPMENT PROGRAM.
Bimonthly progress rept. no. 2,
by D. L. Hollinger and H. T. Plant. 20 Sep 62, 12p. incl. illus. tables.
(Contract NOw 61-0641-c)
Unclassified report

DESCRIPTORS: *Glass textiles, *Composite materials, *Filament wound construction, *Rocket cases, Rings, Epoxy resins, Synthetic fibers, Glass, Manufacturing methods, Drawing (Machine processing), Controlled atmosphere, Moisture, Humidity, Storage, Tests, Tensile properties, Mechanical properties.

Continued work on the effects of moisture in rings made from glass monofilament and epoxy resin, where the binder is applied to the fiber at the bushing as it is drawn, shows the importance of maintaining dry conditions both drawing of the fiber and in the atmosphere surrounding the composite even after curing of the resin. Storage and testing of such rings over silica gel resulted in glass stress levels 20% higher than in comparable rings stored and tested in the normal laboratory atmosphere, although in both cases the fibers were drawn in a low humidity atmosphere. Initial tensile strength tests on uncoated single filaments gave generally low and erratic results. (Author)

AD-285 363 Div. 14, 25
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
ENGINEERING RESEARCH - ECCOFOAM ''Q'' THERMAL CONDUCTIVITY AND ELEVATED TEMPERATURE STABILITY - DETERMINATION OF,
by F. E. Hancock. 22 Aug 58, 6p. incl. illus. tables (Rept. no. FTDM-2026)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Thermal insulation, *Thermal conductivity, Stability, Heat, Temperature, Foams.

The thermal conductivity of Eccofoam Q was determined at various mean temperatures between 103 and 294 F. Thermal stability tests and thermal conductivity tests at higher temperatures were not determined because this material exhibited brittleness at mediocre 'low temperature' thermal conductivity. (Author)

AD-285 365 Div. 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
THERMODYNAMICS - THE APPARENT THERMAL CONDUCTIVITY OF WATER RESERVOIR FLEXIBLE INSULATION (RUBATEX R203-H), DETERMINATION OF,
by H. H. Chandler. 18 Mar 59, 3p. incl. illus. table (Rept. no. FTDM-2210)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Insulating materials, *Foam rubber, *Thermal conductivity, Temperature, Thermocouples, Tests, Thermodynamics.

The thermal conductivity of Rubatex R203-H was determined according to ASTM designation C-177-45. The apparent thermal conductivity as measured, is approximately 0.45 BTU-in/hr ft sq F between mean temperatures of 80 and 140 F. (Author)

AD-285 366 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - PLASTIC RESINS, DIELECTRIC CONSTANT AND LOSS TANGENT - EVALUATION AND QUALIFICATION OF,
by R. L. Thomas. 12 June 59, 13p. incl. tables.
(Rept. no. FGT-2273)
(Contracts AF 33(600)36200 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Laminates, *Plastics, *Resins, Density, Thickness, Epoxy resins, Microwave frequency, Radomes, Materials, Physical properties, Dielectric properties, Electrical properties.

Various physical and electrical properties of the test panels were determined. Three of four laminates made with Epon 828 resin met electrical requirements at the frequencies tested. One Epon 828 and the DER 332 laminates failed to meet the requirement for loss tangent at 8515 megacycles. The Laminac 4232 laminate failed to meet the requirement for dielectric constant at all frequencies tested. (Author)

AD-285 368 Div. 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
THERMODYNAMICS - POLYURETHANE INSULATION - ENVIRONMENTAL COMPATIBILITY,
by C. D. Peacock. 31 Mar 60, 2p. incl. illus.
(Rept. no. FTDM-2553)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Urethanes, *Insulating materials, Hydraulic fluids, Jet engine fuels, Aluminum tubing, Tests, Temperature, Polymers.

AD-285 369 Div. 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
THERMODYNAMICS: POLYURETHANE INSULATION, ENVIRONMENTAL COMPATABILITY,
by George Bridges. 18 Apr 60, 2p. incl. illus.
(Rept. no. FTDM-2576)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Urethanes, *Insulating materials, Jet engine fluids, Tests, Temperature, Polymers.

AD-285 370 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
SCIENTIFIC RESEARCH - DEVELOPMENT OF HIGH TEMPERATURE RESISTANT POLYMERS,
by G. L. Greenfield. 30 Jan 61, 17p. incl. illus. (Rept. no. FGT-2733)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Heat resistant polymers, *Silicon compounds, *Oxygen compounds, *Phosphorus compounds, Ethanols, Amines, Phosphonyl radicals, Benzenes, Acids, Silanes, Glycols, Pentanols, Phenyl radicals, Calcium compounds, Alkoxy radicals, Triazines, Fumaric acids, Chemical reactions, Catalysts, Benzoyl radicals, Peroxides, Epoxides, Synthesis, Molecular weight, Copolymerization, Polymerization.

Polymerization studies on the Si-O-P compounds were conducted. Si-O-P compositions were prepared corresponding in molecular weights to the dimer, trimer, and tetramer. The dimer was formed by the reaction of benzene phosphonylic acid and diphenylsilanediol. Augmentation of this dimer to the trimer was accomplished by catalyzing with triethanolamine in the presence of calcium glycolate. Although polymers of sufficiently high molecular weight to exhibit elasticity were not attained, the approach developed is of significance in polymer science directed toward producing higher molecular weight inorganic polymers. A thermoplastic epoxidized triazine polymer was prepared by copolymerization of 2,4-diglycidyl-6-methoxy-s-triazine and fumaric acid. This polymer could be crosslinked (cured) with benzoyl peroxide catalyst. The cured polymer softened at 100 C, frothed at 150 C, yet became rigid at 250 C. (Author)

AD-285 371 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
EVALUATION OF ANTI-SEIZE MATERIAL FOR HIGH TEMPERATURE APPLICATIONS,
by H. J. Weltman and A. C. Porter. 30 Dec 61, 9p. incl. illus. table (Rept. no. ERR-FW-125)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Antiseize compounds, High temperature research, Tests, Test equipment, Bolts, Nuts, Torque, Laboratory furnaces, Materials.

In an effort to satisfy aerospace demands for high temperature anti-sieze compounds, a project was conducted to evaluate three promising materials. These materials, FEL-PRO C5A, Alpha Molykote 285X, and Convair 2736 were applied to bolt and nut installations. Breakaway torques were measured after heat soaks of 1250, 1550, 1750, and 2000 F. Results of the tests showed that all three materials exhibited good and anti-seize properties in this application. Although no one material was superior at all temperatures tested, the Convair 2736 compound exhibited the best 'over-all' performance over the temperature range. (Author)

AD-285 375 Div. 14, 26
(TISTM/EJH) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - GLASS REINFORCED PLASTIC LAMINATE - BEARING PROPERTIES - DETERMINATION OF,
by R. L. Miller. 9 Mar 61, 15p. incl. illus. tables (Rept. no. FTDM-2810)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Glass textiles, *Laminates, *Bolts, *Bearings, Phenolic resins, Reinforcing materials, Stresses, Loading, Deformation, Mechanical properties, Tests, Failure (Mechanics).

Conolon 506 glass reinforced plastic laminate specimens were tested for various D/t (bearing hole diameter/specimen thickness) ratios. Stress at maximum load was greatest for D/t ratios of 1.0. Failure occurs prior to a deformation of 4% of the bearing hole diameter for D/t ratios of 3.0 and greater, and near to 4% for D/t ratios of less than 3.0. Bearing properties are not significantly affected by taking bearing specimens 45 degrees to the warp direction. (Author)

AD-285 391 Div. 14
(TISTM/ODN) OTS price $2.60

Narmco Industries Inc., San Diego, Calif.
OPTIMUM FILAMENT DIAMETER.
Quarterly rept. no. 3, 1 July-30 Sep 62,
by W. H. Otto. 30 Sep 62, 14p. incl. illus.
(Contract NObs-86347, Proj. SR-007-03-04)
Unclassified report

DESCRIPTORS: *Filament wound construction, *Glass textiles, *Composite materials, *Filaments, *Reinforcing materials, Tensile properties, Fibers, Sea water, Laminates, Mechanical properties, Coatings.

Sea water immersion tests were completed for uncoated and coated large diameter fibers. The protection of the coating retards moisture attack such that 27-day immersion is required before the strength levels off. The strength of uncoated fibers falls much more rapidly and tends to level off at the end of 7 days. Special laminating procedures are required for winding large diameter fibers. It was determined that winding directly from the bushing was the only method of laminating fibers larger than 0.004 in diameter. NOL rings wound with large diameter fibers are structurally superior to those with conventional fibers. Compressive strengths approaching 300,000 psi composite stress are possible as well as composite modulus greater than 10 to the 7th power psi. (Author)

AD-285 406 Div. 14
(TISTM/SJR) OTS price $1.10

Frick Chemical Lab., Princeton U., N. J.
SPECIFIC RATE CONSTANT FOR URETHANE CLEAVAGE,
by A. V. Tobolsky and E. Peterson. Oct 62, 3p. 3 refs. (ONR Technical rept. no. RLT-51)
(Contract Nonr-185807, Proj. NR 356-377)
Unclassified report

DESCRIPTORS: *Rubber, *Urethanes, Deterioration, Stresses, Polymers.

The rate constant for cleavage of the urethane linkage in rubber formed by reacting ethylene-

propylene adipate polyester with several isocyanates was determined. A mathematical expression for stress decay in the temperature range of 100- 140 C was derived.

AD-285 483 Div. 14
(TISTM/ODN) OTS price $4.60

General Dynamics/Fort Worth, Tex.
MANUFACTURING RESEARCH - BONDING - CERAMIC-TO-METAL,
by Huel H. Chandler, Jr. 23 Dec 59, 36p. incl. illus. tables, 16 refs. (Rept. no. MR 59-2)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Ceramic materials, *Metals, *Adhesives, Silver Solders, Brazing, Bibliography, Mechanical properties, Fracture (Mechanics), Stainless steel, Aluminum compounds, Oxides, Titanium, Manufacturing methods, Temperature, Nickel alloys, Alloys, Silver alloys, Copper alloys, Inorganic substances, Tensile properties, Bonding.

Ceramic-to-metal bonding and ceramic adhesives for metals were studied. Successful ceramic-to-metal attachments were made by use of brazing alloys and by mechanical means. The attachment of metal-to-metal with ceramic adhesives was also attained. Small specimens of ceramics and metals were bonded and brazed together. The strength of these bonds was tested at room temperature, 1200 and 1500 F. Some of the brazed specimens exhibited a room temperature tensile strength of 11,000 psi and 5,000 psi when tested at a temperature of 1500 F. The majority of fractures at all temperatures on the brazed ceramic-to-metal test specimens occurred at the ceramic-metallized interface or within the ceramic itself. Several ceramic adhesives were employed in efforts to bond various combinations of alumina, pyroceram, Rene'41, Kovar A metal, RS-140 Ti, and 17-7 PH stainless steel. These specimens were tested at room temperature, 600, 800, and 1000 F. 17-7 PH stainless steel bonded with UI-1067-1A ceramic adhesive resulted in a shear strength of 1900 psi when tested at either room temperature or 1000 F. (Author)

AD-285 484 Div. 14
(TISTM/ODN) OTS price $4.60

General Dynamics/Fort Worth, Tex.
EVALUATION OF STRUCTURAL PROPERTIES OF GLASS REINFORCED PLASTIC CONSTRUCTION AFTER PROLONGED EXPOSURE TO 325 F.
13 Jan 61, 42p. incl. illus. tables (Rept. no. FZM-2024)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Glass textiles, *Reinforcing materials, *Plastics, *Laminates, Materials, Phenolic resins, Epoxy resins, Resins, Esters, Polymers, Temperature, Manufacturing methods, Processing, Physical properties, Electrical properties, Tests, Data, Sandwich construction, Mechanical properties.

Results show that the three resin systems tested can satisfactorily operate at 325 F for 1000 hours. It can also be concluded that the present design allowable based on acceptance values for 300 F for 1/2 hour exposure are realistic for 1000 hours exposure at 325 F without reductions. Modified polyester appears to be the best resin for applications where the material is exposed to 325 F for 3000 hours. Although the mechanical properties of epoxy resin began to decrease sometime between 1000 hours and 3000 hours they were still within a practical range after 3000 hours exposure. Phenolic material was definitely affected by the long exposure at 325 F and its mechanical properties after 3000 hours exposure were unsatisfactory. The electrical properties of the epoxy and modified polyester laminates were satisfactory for all practical purposes after 3000 hours exposure at 325 F. The Epoxy and Phenolic laminated faced sandwich specimens had very similar creep characteristics when exposed at 325 F. (Author)

AD-285 485 Div. 14, 17
(TISTM/ODN) OTS price $4.60

General Dynamics/Fort Worth, Tex.
PROCESS - ADHESIVE BONDING VARIABLES - 2020-T6 UNCLAD ALUMINUM ALLOY - INVESTIGATION OF,
by J. M. Warren. 19 Mar 59, 44p. incl. illus. tables (Rept. no. FGT-2164)
(Contract AF 33(600)36200 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Bonding, *Aluminum alloys, Alloys, Aluminum, Aging, Shear stresses, Sulfuric acid, Sodium compounds, Dichromates, Tests, Cleaning, Films, Data, Processing.

Test results show that the Na2Cr207-H2S04 (Convair FPS-0003) cleaning treatment provides a better surface for bonding 2020-T6 unclad Al with AF-31 and Aerobond 422 adhesives than any of the other five surface treatments investigated. Test results also show that 2020-T6 unclad Al lap shear specimens bonded with AF-31 and Aerobond 422 adhesives possessed bond strengths comparable with 2024-T3 and 7075-T6 Al alloys bonded and tested under similar conditions. (Author)

AD-285 486 Div. 14
(TISTM/ODN) OTS price $6.60

General Dynamics/Fort Worth, Tex.
MATERIAL - GLASS CLOTH REINFORCED PLASTICS - ROOM AND ELEVATED TEMPERATURE - PROPERTIES OF
by S. V. Glorioso. 26 July 60, 59p. incl. illus. tables (Rept. no. FGT-2186)
(Contract AF 33(600)36200 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Glass textiles, *Reinforcing materials, *Plastics, *Laminates, Resins, Temperature, Materials, Tests, Test equipment, Epoxy resins, Data, Mechanical properties.

Empirical data is presented for use in establishing design allowables at room and elevated temperatures for all combinations of the following fabrics and resins; types 181, 143, 120, and 183 cloths with Class II (Laminac 4232), Class III (Conolon 506) and Class IV (Epon 828) resins. Laminates made using 181 cloth had compression strengths parallel to and at 90 degrees to the warp direction which were approximately twice the strength of the material at 45 degrees. Laminates made using 143 cloth had compression strengths which were approximately equal at 45 and 90 degrees to the warp direction. These properties were 55 to 70% less than the strength parallel to the warp direction. Exposures for 100 hours at 300 F at loads of 20 or 40% of the room temperature compressive strength had no effect on the compressive properties at 300 F parallel to the warp direction for some cloth and resin combinations. Similar exposures at loads of 20% of the 300 F compressive strength had no effect on the compressive properties at 300 F for 181 cloth with Class IV (828) resin. (Author)

Division 14 - MATERIALS (NON-METALLIC)

AD-285 487 Div. 14
(TISTM/ODN) OTS price $2.60

General Dynamics/Fort Worth, Tex.
MATERIAL - STRUCTURAL POTTING COMPOUND: FOAMED-IN-PLACE, EPOXY-PHENOLIC RESIN TYPE - QUALIFICATION OF,
by Floyd De Leon, Jr. 29 Apr 59, 26p. incl. illus. tables (Rept. no. FTDM-2243)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Embedding substances, *Epoxy resins, *Phenolic resins, Resins, Manufacturing methods, Aging, Test methods, Viscosity, Analysis, Density, Tests, Data, Materials, Wings, Airplanes, Mechanical properties.

Three types of Thermofoam 607 are in use. The composition and proportions of these are given. Information was needed to verify Convair's proposed specification FMS-0076 for foamed-in-place structural potting compound of the epoxy-phenolic resin type; hence this test was originated to substantiate known characteristics and properties of Thermofoam 607 (types I, IA, and II) and to establish requirements for future acceptance testing of this material. Of all the compression specimens tests, only one went below the proposed minimum values. It was noted that at least one sample of each type of Thermofoam did not meet the density requirement; hence the proposed specification may need to be changed to comply with the test results. The cellular structure of the foam as stipulated in the proposed FMS-0076 (1/4 inch maximum, 1/16 inch average voids) was satisfactory. However, some variation existed in the different lots of material which resulted in varying densities with the same types of foam. Generally, as the density increased the compressive strength was proportionally increased. Adhesive Engineering's Thermofoam 607 meets the requirements of the proposed Convair Specification FMS-0076 except for the density requirement. (Author)

AD-285 488 Div. 14
(TISTM/ODN) OTS price $4.60

General Dynamics/Fort Worth, Tex.
EFFECTS OF ELEVATED TEMPERATURE AND REDUCED ATMOSPHERIC PRESSURE ON ADHESIVES, POTTING COMPOUNDS AND SEALANTS,
by J. P. Thomas and R. J. Stout. 30 Dec 61, 38p. incl. illus. tables, 3 refs. (Rept. no. ERR-FW-129)
(Contract AF 33(657)7748)
Unclassified report

DESCRIPTORS: *Adhesives, *Embedding substances, *Sealing compounds, *Space environmental conditions, Low pressure research, Temperature, Materials, Silicones, Rubber, Butyl rubber, Epoxy resins, Mechanical properties, Laboratory equipment, Tests, Silanes, Phenyl radicals.

Five materials which might have specialized uses on glide and boost-glide type vehicles were evaluated under space environmental conditions of up to 700 F and reduced pressure in the order of 1/1000 mm Hg. Materials selected included, a Si rubber sealant, a butyl rubber cement, an epoxy room temperature curing adhesive, a phenylsilane-based adhesive, and a Viton rubber-based cement. An environment of 200 F and reduced pressure of about 1/1000 mm Hg for 300 hours did not significantly affect the strengths of the materials tested. Retention of adhesion of the butyl rubber cement was also satisfactory after 300 hours at 400 F and about 1.5/1000 mm of Hg vacuum. The Si sealant sponged at about 2.5/1000 mm Hg vacuum and 700 F. It is felt that this material, with slight modifications in initial cure, may exhibit improved thermal stability. Dynabond 118 retained a portion of its strength after exposure to 700 F and approximately 2.5/1000 Hg vacuum. Neither the Epon 931 nor the Viton rubber cement performed satisfactorily under the simulated space conditions. (Author)

AD-285 518 Div. 14, 27
(TISTM/EJH) OTS price $1.60

Raytheon Co., Waltham, Mass.
HIGH TEMPERATURE MATERIALS DEVELOPMENT.
Monthly progress rept. no. 32 for Aug 62. 15 Sep 62, 6p. incl. illus. table, 3 refs. (Rept. no. S-467)
(Contract NOrd-19135)
Unclassified report

DESCRIPTORS: *Refractory materials, *Refractory coatings, *Graphite, *Carbides, *Rocket motor nozzles, Zirconium compounds, Hafnium compounds, Tantalum compounds, Heat resistant alloys, High temperature research, Thermal stresses, Shock resistance, Mechanical properties, Deformation.

Test bars of zirconium Pyrocarbide containing an excess of Pyrographite were tested in flexure to 2000 C. The exceptional strength of this material increases with temperature to 2000 C where it begins to deform plastically indicating that it should be ideal in thermal shock resistance. Pellets of graphite with 20 percent additions of ZrC, TaC, and HfC heated to 3100 C showed no signs of melting. (Author)

AD-285 523 Div. 14, 4, 1
(TISTM/EJH) OTS price $1.60

Tracor, Inc., Austin, Tex.
DEVELOPMENT OF A TRANSPARENT PRESERVATIVE COMPOUND FOR AIRCRAFT STRUCTURAL METALS.
Quarterly rept. no. 1, 17 May-16 Aug 62,
by Robert R. Annand and Jimmie S. Payne, Jr. 18 Sep 62, 10p. incl. table, 9 refs. (Rept. no. GR6-6601)
(Contract NOw 62-0549-c)
Unclassified report

DESCRIPTORS: *Aircraft finishes, *Polymers, *Amines, *Plastic coatings, Coatings, Films, Optical materials, Light transmission, Airplane panels, Carbonyl radicals, Chemical reactions, Solubility, Organic solvents, Metals, Formaldehyde, Methanes, Synthesis, Aircraft finishes.

The ultimate objective of this research is to obtain transparent, hydrocarbon-soluble polymers containing the N-C-N structure. By reacting paraformaldehyde with hexamethylenediamine, two polymeric products were obtained. Both are soluble in hydrocarbons. One of these products, having a molecular weight of 4400, was cast in a film which is not destroyed by immersion in water overnight. This film is readily stripped from the metal by benzene, but not so readily by cyclohexane. Other products of lower molecular weight were obtained. In all cases where the N-C-N structure was clearly demonstrable (IR spectra), hydrocarbon solubility was very high. The chain terminating reactions which prevent formation of long chains appear to involve ketimine and enamine formation. The nature of the reaction is becoming evident, but techniques for consistently obtaining a desirable chain length are yet to be developed. (Author)

AD-285 569 Div. 14
(TISTM/TCG) OTS price $2.25

Manufacturing Labs., Inc., Cambridge, Mass.
INVESTIGATION OF DIFFUSION BARRIERS FOR REFRACTORY METALS.
Final rept., May 60-Mar 62 on Finishes and Materials Preservation,
by E. M. Passmore, J. E. Boyd, and B. S. Lement.
July 62, 87p. incl. illus. tables, 30 refs.
(Contract AF 33(616)6354, Proj. 7312)
(ASD TDR 62-432) Unclassified report

DESCRIPTORS: *Refractory materials, *Metals, *Coatings, Melting, Solids, Temperature, Transition temperature, Thickness, Heat treatment, Reaction kinetics, Welds, Pressure, Oxidation, Growth, Tungsten, Molybdenum, Tantalum, Niobium, Rhenium, Microstructure, Alloys, Diffusion.

Thirty-three base barrier combinations involving the four refractory metals: W, Mo, Ta, Cb; and 12 potential barrier metals having melting points over 1700 C were evaluated for relative interdiffusion behavior at 1700 C. Further evaluation of promising W and Ta-base combinations was carried out at 1800 C. In general, the relative extent of interdiffusion decreases with increasing base-barrier solidus temperature, although wide variations occur for melting points up to 2100 C. The thickness (X) of the total interdiffusion zone as well as of the intermediate phase layers in the W-Re, Mo-Re, Ta-Re, and Cb-Re combinations was found to increase with time (t) in accordance with $X(n) = kt$, with values of n in the range 1.4 to 4.9. Approximate over-all interdiffusion coefficients, D sub s, of 3.4 x 10 to the 6th power, 9.0 x 10 to the 5th power, 1.9 x 10 to the 8th power, and 5.1 x 10 to the 8th power sq cm/sec were found for the W-Re, Mo-Re, Ta-Re, and Cb-Re combinations, respectively. (Author)

AD-285 577 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - PLASTIC CLAMPS (LUNN COMPANY) - EVALUATION OF,
by S. C. Clayton. 10 Apr 57, 4p. incl. illus.
(Rept. no. FTDM-1728)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Plastics, *Clamps, Glass textiles, Humidity, Vibration, Electrical equipment, Tests, Aluminum.

AD-285 581 Div. 14, 26
(TISTM/TCG) OTS price $9.60

Solar Aircraft Co., San Diego, Calif.
DIFFUSION BONDING OF REFRACTORY METALS.
Interim technical documentary progress rept. no. 1, 29 June-28 Sep 62,
by A. G. Metcalfe and T. B. Lindemer. 1 Oct 62, 1v. incl. illus. tables, 2 refs. (Rept. no. RDR 1322-1)
(Contract AF 33(657)8789, Proj. 7-935)
Unclassified report

DESCRIPTORS: *Refractory materials, *Metals, *Diffusion, *Bibliography, Brazing, Welding, Bonded joints, Manufacturing methods, Test equipment, Quality control, Welded joints, Bonding.

Refractory metals have the strength necessary for high-temperature applications on aerospace vehicles, but cannot be considered ideal materials until the twin problems of oxidation protection and joining are solved. The joining problem has its origin in the embrittlement of the refractory metal in many of the thermal cycles required for joining by brazing or welding. The purpose of this program is to avoid this embrittlement by diffusion bonding below these embrittlement temperatures. Equipment will be developed to bond alloys by this process and joints will be evaluated for reliability. No coating development is planned on this project, but the reliability of joints in the coated condition will be established. This report summarizes the literature on diffusion bonding, analyzes the available information, and proposes the evaluation of certain new concepts for possible addition to the program. The literature survey has confirmed the high potential available by use of diffusion bonding for refractory metals. (Author)

15. MATHEMATICS

AD-284 572 Div. 15
(TISTP/MS) OTS price $1.10

Navy Underwater Sound Lab., Fort Trumbull, New London, Conn.
EXPERIMENTAL STUDY OF THE POWER ASSOCIATED WITH THE KOLMOGOROV-SMIRNOV TEST,
by Benjamin F. Cron, Clair J. Becker, and Beverly C. Hassell. 27 June 62, 7p. incl. illus. tables (USL rept. no. 554)
Unclassified report

DESCRIPTORS: *Probability, *Statistical tests, *Statistical distributions, Statistical analysis, Mathematical analysis, Experimental data.

The Kolmogorov-Smirnov test is coming into greater use as a test for fit of a theoretical distribution to a given sample. In an experimental study, samples of different sizes were randomly drawn from a normal population. The Kolmogorov-Smirnov test was then used to test the hypothetical assumptions that the samples were drawn from normal, uniform, Rayleigh, logarithmic normal, and gamma distributions, respectively. The purpose of these tests was to determine how the probability of rejecting a false hypothesis (i. e., the power of the test) varies as a function of the size of the samples taken for a fixed Type I error. Experimental graphs of the power function for the Kolmogorov-Smirnov test versus sample size are given for the various hypothetical assumptions. (Author)

AD-284 889 Div. 15
(TISTP/JW) OTS price $1.75

Military Physics Research Lab., U. of Texas, Austin.
RESEARCH ON LINEAR OPERATORS WITH APPLICATIONS TO SYSTEMS ANALYSIS.
Final report,
by Ralph E. Lane. June 62, 62p. incl. illus. 11 refs.
(Contract AF 33(616)7994, Proj. 5227)
(ASD TDR 62-393)
Unclassified report

DESCRIPTORS: *Linear systems, *Transformations (Mathematics), Electric currents, Circuits, Functions, Functional analysis, Equations, Analysis, Operators (Mathematics).

A transformation which has the following three properties is said to be a linear operator: (1) If f is a member of a certain class of quasi-continuous functions, then Tf is a function. Note that the function f need not have a derivative, and it need not even be continuous; it may be a step-function or almost any other kind of

function with which one may need to deal. (2) If f = f sub 1 + f sub 2, then Tf = Tf sub 1 + Tf sub 2; and if k is a number, then T(kf) = k(Tf). That is to say, the transformation T is linear. (3) For each real number s, there is a positive number B sub s such that if M is greater than f(s-t) for each number t in a certain set, then Tf(s) is smaller than MB sub s; that is to say, the transformation T is bounded. The present status of research on linear operator theory and applications is surveyed. Technical emphasis is devoted to use of linear operator equations for solving problems about physical systems. Analysis of electric circuits is used as a framework to make the presentation specific. A summary of the theory is given with examples. Appendix A treats the application of linear operator theory to the numerical approximation of solutions to differential equations. (Author)

AD-285 010 Div. 15
(TISTP/MS) OTS price $4.60

Adelphi Coll., Garden City, N. Y.
A NECESSARY AND SUFFICIENT CONDITION FOR STABILITY OF DIFFERENCE SCHEMES FOR INITIAL VALUE PROBLEMS,
by Mary Louise Buchanan. Sep 62, 41p. 10 refs.
(AGM rept. no. 105)
(Contract Nonr-336001, Proj. NR 041-252)
Unclassified report

DESCRIPTORS: *Partial differential equations, *Integral equations, *Matrix algebra, Complex numbers, Operators (Mathematics), Stability.

AD-285 034 Div. 15
(TISTP/WH) OTS price $2.60

Florida State U., Tallahassee.
SOME RELATIONSHIPS AMONG SENSORY DIFFERENCE TESTS.
Technical rept. no. 6 on the Development of Statistical Methods for Quality Control and Surveillance Testing. Subjective Testing and Quality Evaluation,
by Ralph A. Bradley. Sep 62, 22p. incl. tables, 12 refs.
(Contract Nonr-98808)
Unclassified report

DESCRIPTORS: *Sensory perception, *Medical research, *Statistical tests, *Psychometrics.

AD-285 035 Div. 15
(TISTP/JW) OTS price $1.60

Florida State U., Tallahassee.
ADDITIONAL TABLES FOR THE SEQUENTIAL GROUPED RANK-SUM TEST.
Technical rept. 5 on the Development of Statistical Mehtods for Quality Control and Surveillance Testing. Subjective Testing and Quality Evaluation,
by Sarla D. Merchant and Ralph A. Bradley.
Aug 62, 2p. tables, 1 ref.
(Contract Nonr-98808, Proj. NR 042-004)
Unclassified report

DESCRIPTORS: *Algebras, *Sequential analysis, *Statistical processes, Tables, Test methods, Quality control.

AD-285 070 Div. 15
(TISTP/MS) OTS price $1.60

RAND Corp., Santa Monica, Calif.
THE CAUCHY-SCHWARTZ INEQUALITY FOR AN OPERATOR-VALUED INNER PRODUCT,
by J. W. Kitchen, Jr. Sep 62, 7p. 4 refs.
(Research memo. no. RM-3323-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Functional analysis, *Topology, *Inequalities, Groups (Mathematics), Operators (Mathematics), Algebra, Series, Algebras, Operational calculus, Fourier analysis, Functions, Theory.

In many branches of functional analysis there is a crucial set of inequalities which must be established before much else is possible. The Cauchy-Schwartz inequality plays such a role in the theory of Hilbert spaces. A far-reaching generalization of this basic inequality is presented. This presentation is the outgrowth of a study of the Fourier expansion theory for almost periodic functions. (Author)

AD-285 145 Div. 15
(TISTP/TL) OTS price $1.60

Educational Testing Service, Princeton, N. J.
SMALL SAMPLE FREQUENCY DISTRIBUTION OF STEPPED-UP RELIABILITY COEFFICIENTS BASED ON SPLIT-HALVES,
by Walter Kristof. Aug 62, 15p. 10 refs. (Rept. no. RB-62-19)
(Contract Nonr-275200, Proj. NR 151-201)
Unclassified report

DESCRIPTORS: *Reliability, *Sampling, *Statistical tests, *Statistical distribution, Statistical functions, Real variables, Population, Errors.

Maximum-likelihood estimates of stepped-up reliability coefficients are developed and their sampling distributions derived. These estimates turn out to be biased. So new unbiased estimates are developed with even smaller sampling variances and recommended for general use whenever some statistical assumptions about the test halves hold. Finally, some statistical tests based on the sampling distributions are described. (Author)

AD-285 176 Div. 15
(TISTP/TL) OTS price $1.10

Electronics Research Lab., U. of Calif., Berkeley.
PROOF OF A GENERAL RELATIONSHIP USED IN THE STABILITY TEST OF LINEAR DISCRETE SYSTEMS. AN ADDENDUM TO A SIMPLIFIED STABILITY CRITERION FOR LINEAR DISCRETE SYSTEMS AND ON THE ROOTS OF A REAL POLYNOMIAL INSIDE THE UNIT CIRCLE AND A STABILITY CRITERION FOR LINEAR DISCRETE SYSTEMS,
by E. I. Jury. 26 Dec 61, 8p. 3 refs. (Series no. 60, Issue nos. 373 and 425)
(Grant no. AF-AFOSR-62-70)
Unclassified report

DESCRIPTORS: *Linear systems, *Polynomials, *Stability, Tests, Determinants, Complex variables.

AD-285 178 Div. 15
(TISTP/TL) OTS price $1.60

Coordinated Science Lab., U. of Illinois, Urbana.
REALIZABILITY OF FUNDAMENTAL CUT-SET MATRICES OF ORIENTED GRAPHS,
by Wataru Mayeda. July 62, 13p. incl. illus. 12 refs. (Rept. no. R-143)
(Contract DA 36-039-sc-85122)
Unclassified report

DESCRIPTORS: *Topology, *Matrix algebra, *Convex sets, Electrical networks, Communication systems, Nets, Sequences, Tables, Experimental data.

As topology (linear graph theory) was recognized to be a suitable tool to solve many problems in electrical networks, switching circuits, communication nets, etc., the necessary and sufficient conditions that a matrix be a fundamental cut-set (or circuit) matrix becomes one of the important problems in this field. If the problem is to find whether a given matrix is a fundamental cut-set matrix of a non-oriented graph, there are four methods of testing such a matrix at present. One of these methods is modified such that we can test whether a given matrix is a fundamental cut-set matrix of an oriented graph. (Author)

AD-285 195 Div. 15
(TISTP/GRW) OTS Price $3.60

System Development Corp., Santa Monica, Calif.

THE FUNCTION $J(x,y) = \int_0^x \frac{\gamma(y,\xi)}{\xi} d\xi$. SOME PROPERTIES AND A TABLE,
by C. J. Ancker, Jr. and A. V. Gafarian. Apr 62, 36p. incl. illus. tables, 10 refs.
Unclassified report

DESCRIPTORS: *Functions, *Probability, Taylor's series, Integral transforms, Tables.

AD-285 197 Div. 15
(TISTP/WH) OTS price $1.10

Army Engineer Research and Development Labs., Fort Belvoir, Va.
WAYS TO INCREASE THE EFFECTIVENESS OF THE PRINCIPLE OF LEAST SQUARES IN OVERCOMING SYSTEMATIC ERRORS,
by A. E. Bolotin. Sep 62, 5p. 4 refs. (Trans. no. 1623 from Isvestiya Visshikh Uchebnikh Zavedeniy Razdel Geodeziya i Aerofotosemka 4:pp. 39-42, 1961)
Unclassified report

DESCRIPTORS: *Analysis of variance, *Least squares method, *Errors, USSR.

AD-285 208 Div. 15
(TISTP/TL) OTS price $2.60

Yale U., New Haven, Conn.
(No title).
Final rept., 1 Sep 61-31 Aug 62, by Charles E. Rickart. 31 Aug 62, 7p.
(Grants Nonr(G)00031-61 and Nonr (G)00095-62)
Unclassified report

DESCRIPTORS: *Algebras, Integral transforms, Functional analysis, Groups (Mathematics), Transformations (Mathematics), Topology, Operator (Mathematics), Tensor analysis.

AD-285 209 Div. 15
(TISTM/MS) OTS price $1.10

Yale U., New Haven, Conn.
(No title).
Final rept., 1 Sep 60-31 Aug 61, by Charles E. Rickart. 31 Aug 61, 2p.
(Grant Nonr(G)00012-60)
Unclassified report

DESCRIPTORS: *Groups (Mathematics), *Algebraic topology, Functions.

AD-285 255 Div. 15, 32
(TISTP/MS) OTS price $8.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
HIGH-SPEED DOCUMENT PERUSAL.
Final technical rept., 1 Apr 61-1 Apr 62, by M. Kochen, C. T. Abraham and others. 1 May 62, 96p. incl. illus. table, refs.
(Contract AF 49(638)1062)
(AFOSR-2817) Unclassified report

DESCRIPTORS: *Information retrieval, *Indexes, *Mathematical computer data, *Mathematical logic, *Documentation, Automatic, Reading, Sampling, Sequences, Human engineering, Machine translation, Coding, Mathematical analysis, Computers, Reading machines.

This report includes:
A SAMPLING PROCEDURE FOR CLUSTERING SIMILAR DOCUMENTS, by C. T. Abraham. Dec 61.

TIME ESTIMATION IN BOOLEAN INDEX SEARCHING, by E. Wong. Dec 61.

AN ENGLISH-LIKE EXTENSION OF AN APPLIED PREDICATE CALCULUS, by H. Bohnert. Feb 62.

AFOSR support led to the accomplishment of five results concerning the possibility of high-speed document perusal. These are: derivation of a formula for the average time to search an index; algorithms for translating English-like sentences into logic-like sentences; development of efficient techniques for grouping similar texts; implementation of a high-speed automatic dictionary lookup procedure; and, construction of computer programs for constructing representative abstracts and index terms. These constitute some first steps toward experimentally demonstrating the feasibility of a cooperative man-machine system for high-quality, high-speed perusal of large document collections; also, toward solving some of the basic logico-linguistic problems in the way of more completely automatic, high-quality perusal. (Author)

AD-285 275 Div. 15
(TISTP/GRW) OTS price $1.10

Naples U. (Italy).
ASYMPTOTIC CONVERGENCE OF RENORMALIZED PERTURBATIVE EXPANSION,
by E. R. Caianiello. 30 July 62, 7p. 6 refs.
(Technical note no. 8)
(Contract AF 61(052)434)
Unclassified report

DESCRIPTORS: *Series, *Integral equations, Integration.

It is proved that the renormalized perturbative expansions of propagation kernels in configuration space, for finite space-time volume of integration, are asymptotically convergent in the sense of Poincare, if it is assumed that the kernels themselves are continuous functions of the expansion parameter in a neighborhood of the value of the parameter for which the expansions are made. (Author)

Division 15 - MATHEMATICS

AD-285 310 Div. 15
(TISTP/TL) OTS price $6.60

System Development Corp., Santa Monica, Calif.
AN INTRODUCTION TO SET THEORY,
by Charles K. Gordon, Jr. 27 July 62, 63p. incl. illus. 3 refs. (Rept. no. SP-893)
Unclassified report

DESCRIPTORS: *Convex sets, *Measure theory, *Topology, *Mapping, *Algebras, *Probability.

The terminology, symbology, axioms, and some principal theorems of set theory are presented in sufficient detail to permit their use and to stimulate study of additional areas of application. The organization and style of the presentation are deliberately informal and are intended to guide the inexperienced reader toward a sound comprehension of principles and of one fruitful application. Examples and analogies drawn from common experience supplement the mathematical derivations. The application of set theory to probability theory is demonstrated. Three references are cited. Mastery of this material will afford the background necessary for advanced study, for understanding other applications, and for evaluating the potential usefulness of set theory in the reader's professional specialty. (Author)

AD-285 354 Div. 15
(TISTP/MS) OTS price $1.60

Educational Testing Service, Princeton, N. J.
TESTING HOMOGENEITY OF RELIABILITY COEFFICIENTS,
by Walter Kristof. Sep 62, 13p. 6 refs. (Rept. no. RB-62-22)
(Contract Nonr-275200, Proj. NR 151-201)
Unclassified report

DESCRIPTORS: *Statistical processes, *Statistical tests, *Statistical functions, Matrix algebra, Statistical distributions, Reliability.

The likelihood ratio significance test for the hypothesis of homogeneity of two empirical reliability coefficients is presented. It is assumed that both tests were administered to the same sample and are split into equivalent halves. A numerical example serves as an illustration. (Author)

AD-285 477 Div. 15
(TISTP/TL) OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
BALANCED INCOMPLETE BLOCK DESIGNS AND ABELIAN DIFFERENCE SETS,
by H. B. Mann. Aug 62, 19p. 8 refs. (Mathematical note no. 267; Rept. no. D1-82-0195)
Unclassified report

Also available from the author.

DESCRIPTORS: *Matrix algebra, *Groups (Mathematics), Inequalities, Polynomials.

A new representation of balanced incomplete block designs in terms of permutation matrices is given. This analysis is concerned with the study of Abelian difference sets. The analysis contains several new results together with a self-contained exposition of known results. (Author)

AD-285 497 Div. 15, 30
(TISTP/MS) OTS price $1.60

Naval Research Lab., Washington, D. C.
A METHOD OF SYNTHESIZING HIGHER ORDER FUNCTIONS,
Interim rept.,
by Barbour Lee Perry and H. P. Birmingham.
12 Sep 62, 11p. incl. illus. (NRL rept. no. 5823)
Unclassified report

DESCRIPTORS: *Functions, Feedback, Analog computers, Test method, Simulation, Polynomials.

This paper describes a general direct method of synthesizing nth order transfer functions by means of block diagrams and subsequent analog computer simulation. In this generalization of techniques long found useful, the transfer function is written in the form of a polynomial numerator with a polynomial denominator. This method outlined permits the synthesis of a large family of higher order systems. For the case where the order m of the numerator is less than or the same as the order n of the denominator, the synthesis requires only n unity integrators and two summing junctions. If the order m of the numerator is greater than the order n of the denominator, the synthesis requires m-n differentiators as well as the n unity integrators and two summing junctions. Once the transfer function is represented by a block diagram, it is feasible with the aid of analog computer simulation and other techniques, to design equipment which will exhibit desired characteristics. (Author)

AD-285 507 Div. 15
(TISTP/GRW) OTS price $1.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
ASYMPTOTIC BEHAVIOR OF EIGENVALUES FOR A CLASS OF INTEGRAL EQUATIONS WITH TRANSLATION KERNELS,
by M. Rosenblatt, June 62, 18p. 7 refs. (Technical rept. no. 6)
(Contract Nonr-56229, Proj. NR-042-217)
Unclassified report

DESCRIPTORS: *Integral equations, *Functions, Polynomials, Functional analysis.

An immediate interpretation is made in terms of certain representation theorems for stationary random processes on a finite time interval. The interest is in finite interval translation kernel integral equation eigenvalue problems. (Author)

AD-285 527 Div. 15
(TISTP/GRW) OTS price $1.10

Case Inst. of Tech., Cleveland, Ohio.
RECURRENCE RELATIONS FOR THE FIRST TWO INVERSE MOMENTS OF THE POSITIVE BINOMIAL VARIABLE,
by Zakkula Govindarajulu. May 62, 6p. incl. table, 5 refs. (Case Statistical Lab. pub. no. 1063)
(Grant AFOSR 62-72)
Unclassified report

DESCRIPTORS: *Binomials, Integrals.

Recurrence formula for the second inverse moments of the positive binomial variable was derived. The method of obtaining recurrence formulae for its higher inverse moments was indicated. The cumulative rounding error propagated by using these formulae recurrently was considered. Bounds for the propagated rounding error were obtained. By comparing some of the moments evaluated by the use of recurrence formulae, with the true values, it is noted that the rounding error involved in the first two inverse moments will be at most one unit in the last decimal place and the error will be practically zero when p is large. (Author)

AD-285 533 Div. 15
(TISTP/MS) OTS price $1.60

System Development Corp., Santa Monica, Calif.
A NOTE RELATIVE TO RABIN'S COMPUTABLE GAMES,
by Thomas G. McLaughlin. 4 Sep 62, 9p. 2 refs.
(Technical memo. no. TM-752)

Unclassified report

DESCRIPTORS: *Games theory, Sequences, Mathematical logic, Algebras, Operations research.

Two results related to Theorem 2 of Effective Computability of Winning Strategies by M. O. Rabin are exhibited. Results are with respect to a modified notion of a match based on an appropriate one of Rabin's games of type g. (Author)

16. MEDICAL SCIENCES

AD-284 502 Div. 16
(TISTB/MD) OTS price $3.60

Baylor U. Coll. of Medicine, Houston, Tex.
FURTHER EXPERIMENTAL AND CLINICAL OBSERVATIONS ON HEMORRHAGIC SHOCK.
Rept. 1 Nov 60-30 July 62,
by James D. McMurrey. 30 July 62, 1v. incl. tables, 55 refs.
(Contract DA 49-007-md-564)
Unclassified report

DESCRIPTORS: *Traumatic shock, *Blood volume, *Surgery, *Blood circulation, Man, Laboratory animals, Dogs, Labeled substances, Tracer studies, Circulatory system, Heart.

Measurements of blood volume in cardiovascular surgical patients indicated good correlation of postoperative measurements with preoperative values when the patients were stable, but were in considerable error when vital signs were unstable, or when vasopressor substances were being administered. In the absence of clinical evidence of heart disease, cardiac output and coronary blood flow were well maintained in the postsurgical period. Myocardial blood flow and cardiac output measurements in patients with acute hemorrhagic and traumatic shock increased in patients below age 40 and were essentially unchanged from the predicted value in patients over 40. In dogs subjected to hemorrhagic shock discrepancies of measured blood volume after shock has intervened with volumes known to exist in the animal obtained by substracting volume of shed blood from preshock measured volume cannot be explained by tracers of plasma, of red cells, or of tracers of plasma and red cells combined. Ligations of arteries to the extremities and to the gastrointestinal tract do not protect the animal from hemorrhagic shock. (Author)

AD-284 542 Div. 16
(TISTB/AW) OTS price $21.00

Army Medical Research and Nutrition Lab., Denver, Colo.
(No title).
Annual progress rept. for 1 July 61-30 June 62 on Internal Medicine and Basic Research in Life Sciences,
by L. R. Kuhn, W. C. Morse and others.
30 June 62, 349p. incl. table (Rept. no. MEDDH-228)
(Projs. 6X60-01-001 and 6X99-26-001)
Unclassified report

DESCRIPTORS: *Military medicine, *Medical research, *Nutrition, *Metabolism, Lungs, Tuberculosis, Pathology, Data processing systems, Calcium, Carbohydrates, Diet, Vitamins, Algae, Amino acids, Lipids, Steroids, Thiamine, Minerals, Glycines, Pyridoxine, Exercise, Oxygen consumption, Enzymes, Iodine, Microbiology, Kidneys, Isoniazid, Metals.

AD-284 564 Div. 16
(TISTB/MD) OTS price $1.60

Montana State U., Missoula.
THE EFFECT OF A HIGH PROTEIN DIET UPON THE RENAL CONCENTRATING RESPONSE TO VASOPRESSIN AND TO DEHYDRATION OF APLODONTIA RUFA AND THE DOMESTIC RABBIT.
Annual progress rept., 1 Jan-1 Sep 62,
by E. W. Pfeiffer. 12 Sep 62, 19p. incl. illus. tables, 11 refs.
(Contract DA 49-193-md-2221)
Unclassified report

DESCRIPTORS: *Pituitary hormones, *Kidneys, *Urine, Water privation, Diet, Proteins, Urea, Blood vessels, Histology, Rodents, Laboratory animals, Rabbits.

Eight Aplodontia rufa and 10 rabbits were fed high and low protein diets. Plasma and urine urea-nitrogen concentrations were higher in both species which were fed a high protein diet. Seven A. rufa which were given 1% urea in the drinking water had the highest plasma urea-nitrogen concentrations. High protein-fed rabbits achieved a higher urine concentration and maximum urine-plasma osmolality ratio in response to vasopressin injection during water diuresis than those fed a low protein diet, but there was no difference in the urine concentration and maximum urine/plasma osmolality ratio in vasopressin injected A. rufa that were fed a high protein diet, urea loaded, or fed a low protein diet. Six high-protein-fed A. rufa subjected to dehydration had the same urine concentration as those fed a low protein diet. The role of urea in urine concentration is discussed and it is postulated that the lack of looped vasa recta in the renal medulla of A. rufa may be a factor in the inability of urea to increase the renal concentrating ability in this species. (Author)

AD-284 567 Div. 16
(TISTB/CDM) OTS price $1.60

Southwest Research Inst., San Antonio, Tex.
GUIDE TO PLANT IDENTIFICATION.
Supplementary rept.,
by F. W. Bieberdorf. 15 Dec 61, 17p. incl. illus.
(Contract AF 30(602)2141, Proj. 917-1)
Unclassified report

DESCRIPTORS: *Plants, *Handbooks, Trees, Grasses, Europe, Identification.

This guide to plant identification was prepared to assist in the identification of various plant species, and was intended for use by persons who are not skilled botanists. Details of plant structure have been included in as complete form as possible. Both common names and botanical names are given. The botanical names follow the usual system of classification by species, genus, family, order, subdivision, and division. (Author)

AD-284 683 Div. 16
(TISTB/CCH) OTS price $1.60

Retina Foundation, Boston, Mass.
STUDIES OF CERTAIN BIOLOGICALLY IMPORTANT POLY-ANION-ORGANIC CATION COMPLEXES AS ENERGY TRANSFER SYSTEMS,
by Endre A. Balazs. 31 May 62, 15p. incl. illus. tables, 19 refs. (Scientific rept. no. 2)
(Contract AF 19(604)8476, Proj. 4769)
(AFCRL 62-851) Unclassified report

DESCRIPTORS: *Amines, *Dyes, *Mucosaccharides, Polymerization, Fractionation, Chondroitin sulfate, Spectrographic analysis, Glucose, Absorption.

Visible absorption spectra were made of glucosaminoglycan and galactosaminoglycan fractions prepared as outlined in Scientific Report No. 1 and complexed with Azure A dye. Evidence was found to indicate that the molecular weight and the charge density influence metachromasia, but more experimental evidence is needed before further evaluation of the data can be made. (Author)

AD-284 688 Div. 16, 28
(TISTB/AW) OTS price $.50

Aerospace Medical Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SPEECH DURING WEIGHTLESSNESS.
Rept. for June 60-June 61 on Biomechanics of Aerospace Operations,
by Charles W. Nixon and Cecil E. Waggoner.
May 62, 10p. incl. illus. tables, 6 refs.
(Proj. 7231)
(MRL TDR 62-45) Unclassified report

DESCRIPTORS: *Weightlessness, *Speech, Speech transmission, Intelligibility.

Certain characteristics of human speech exhibited under 1-g conditions may be different under weightless conditions. If such differences exist, they might interfere with satisfactory speech communication under conditions of zero gravity. Standard speech materials recorded under conditions of 0 g, 1 g, and 2-1/2 g's were evaluated by both objective and subjective methods. Results indicate that speech production is not significantly altered by brief periods of zero gravity. Reception of speech also seems to be unaffected. Both speakers and listeners indicate good speech intelligibility under conditions of weightlessness. (Author)

AD-284 752 Div. 16
(TISTB/SAT) OTS price $3.60

Linde Co., Div. of Union Carbide Corp., New York.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD XII. PROCEDURES FOR THE DETERMINATION OF IN VIVO SURVIVAL OF PRESERVED RED CELLS IN HUMANS.
Progress rept.,
by A. P. Rinfret. 15 Aug 62, 29p. 15 refs.
(Contract Nonr-300300)
Unclassified report

DESCRIPTORS: *Blood, *Erythrocytes, Viability, Labeled substances, Radioactive isotopes, Blood transfusions, Blood volume, Radioactivity, Phosphorus, Chromium, Scintillation counters, Blood plasma, Tracer studies, Preservation.

Many of the existing procedures for the determination of in vivo survival of red blood cells are evaluated and the potential errors of some of these procedures when applied to frozen - thawed blood are discussed. Three procedures for the in vivo determination of red cell survival in humans are discussed in detail. The first two employ phosphorus-32 and chromium-51. The third procedure employs a chromium-51, chromium-51 double tagging. All equipment necessary for any of the three procedures is listed. (Author)

AD-284 818 Div. 16
(TISTB/MD) OTS price $1.60

Retina Foundation, Boston, Mass.
STUDIES OF CERTAIN BIOLOGICALLY IMPORTANT POLYANION-ORGANIC CATION COMPLEXES AS ENERGY TRANSFER SYSTEMS,
by Endre A. Balazs. 30 Nov 61, 6p. incl. tables, 21 refs. (Scientific rept. no. 1)
(Contract AF 19(604)8476, Proj. 4769)
(AFCRL 62-850) Unclassified report

DESCRIPTORS: *Mucosaccharides, *Polymers, *Molecular weight, *Fractionation, Chromatographic analysis, Viscosity, Complex compounds, Chondroitin sulfate, Solubility, Eye.

Two polyanionic materials, keratan sulfate, a glycosaminoglycan from bovin cornea, and sodium polyacrylate, a synthetic polymer, were fractionated by means of ECTEOLA resin chromatography and cetyl pyridinium complex formation, respectively. Both methods showed that these fractions exhibited a linear relationship. Chondroitin sulfate from bovin cornea was also fractionated on an ECTEOLA resin column. (Author)

AD-284 909 Div. 16
(TISTB/MD) OTS price $1.10

Lund U. (Sweden).
RESEARCH ON EFFECTS OF ACETYLCHOLINE ON THE MAMMALIAN MOTOR END-PLATE.
Final technical rept.,
by Stephen Thesleff. 15 Aug 62, 5p. 12 refs.
(Contract AF 61(052)106)
Unclassified report

DESCRIPTORS: *Neuromuscular transmission, *Chemoreceptors, Muscles, Mammals, Man, Acetylcholines, Diseases, Physiology.

Investigations of the electrophysiological properties of the mammalian motor end-plate reveal: (1) Prolonged or intermittent application of acetylcholine desensitizes the chemoreceptors of the motor end-plate. (2) The motor nerve controls the size of the chemosensitive surface in muscle fiber, presumably through the release of a chemical mediator. (3) The chemical sensitivity of end-plate receptors in muscles from patients with myasthenia gravis is normal, suggesting that the neuromuscular defect in this disease is of pre-junctional origin.

AD-284 916 Div. 16
(TISTB/AW) OTS price $1.10

Maryland U., College Park.
INDEX CATALOGUE TO RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE IN MEDICAL ENTOMOLOGY.
Annual progress rept., 1 Feb-30 Sep 62,
by George Anastos. 30 Sep 62, 4p.
(Contract DA 49-193-md-2238)
Unclassified report

DESCRIPTORS: *Indexes, *Catalogs, *Insects, *Diptera, Medicine, Translations, Europe, USSR, China.

Progress is reported on (1) the preparation of an index catalogue of references in medical entomology from Russia, Eastern Europe and China, (2) translation of articles of general interest to medical entomologists, and (3) the preparation of a Russian-English, English, Russian glossary of terms in medical entomology. Approximately 25,000 Keysort cards from the current files were sorted into the following categories: Diptera, Ticks, Mites, Fleas, Lice, Bedbugs, Protozoan Diseases, Bacterial Diseases, Rickettsial Diseases, Spirochaetal Diseases, Viral Diseases and Unclassified Diseases. The first draft of the manuscript for the Diptera, comprising 2,836 references, is compiled and is being edited to standardize the spelling of authors' names and journal names. The anticipated date of publication of the Diptera is late December or early January. The first draft of the tick references is being typed and will be the next section to be published. One major translation on fleas is currently in progress, and two shorter works on ticks are completed and will be distributed shortly. A Russian-English, English, Russian glossary of medical entomology was prepared and is being standardized against existing glossaries in other languages. The estimated publication date for the glossary is in early 1963. (Author)

Division 16 - MEDICAL SCIENCES

AD-284 931 Div. 16
(TISTB/WA) OTS price $1.10

Uppsala U. (Sweden).
HISTOLOGY OF THE SURGICAL RADIOLESION IN THE HUMAN BRAIN AS PRODUCED BY HIGH ENERGY PROTONS,
by William Mair, Bror Rexed, and Patrick Sourander. 28 Aug 62, 6p. illus. 6 refs.
(Technical note no. 4)
(Contract AF 61(052)183)
Unclassified report

Presented at the Symposium on High Energy Protons, arranged 11 Aug 62 at Harrogate, Yorkshire, England.

DESCRIPTORS: *Brain, *Protons, *Radiobiology, *Radiation injuries, Radiation effects, Histology, Nervous system, Pathology, Pain.

Changes in the mid brain of a man following irradiation were studied on one side of the spinothalamic tract region by high energy protons to relieve pain. The man was 59 and suffered from intractable pain due to cancer of the lung with spread to the axilla and the supraclavicular region. The irradiated region was sharply demarcated being ovoid in shape with a crenated border. Destruction of myelin sheaths, axons, astrocytes and oligodendroglia occurred in the irradiated region and some tiny perivascular haemorrhages were present. Nuclear debris and collections of macrophages were found at the edge of the necrosis. Little proliferation of astrocytes was seen 9 weeks after irradiation. The changes were exactly similar to those seen in goats 7 and 4 weeks after irradiation with the same dose. Tiny, discrete, rounded, zones of necrosis were seen in man just rostral to the confluent necrosis. They are presumably the result of intersecting beams as they pass to the center of irradiation. (Author)

AD-284 965 Div. 16
(TISTB/AW) OTS price $3.60

Illinois U., Urbana.
EXPERIMENTAL KETOSIS IN MAN. ''COLD KETOSIS'' COMPARED WITH POST-EXERCISE KETOSIS AND NUTRITIONAL KETOSIS.
Annual progress rept. no. 1, 1 Feb-30 Sep 62,
by Robert E. Johnson. 30 Sep 62, 13p. tables, refs.
(Contract DA 49-193-md-2222)
Unclassified report

DESCRIPTORS: *Alkalosis, *Exercise, *Biochemistry, *Exposure, Man, Temperature, Water, Metabolism, Nutrition, Electrolytes (Physiology).

Reports that the severity of the post-exercise ketosis induced by walking is decreased by a warm environment and a negative water balance, acting independently, were investigated. Eight young men walked ten miles on a treadmill and rested thereafter for six hours without eating. The basal and recovery temperatures were kept at 25 C. In three different walks the temperatures were kept at 8, 25, and 8 C respectively. Ketosis was generally greater after the 'cool walks' than after the 'warm walk.' After moderate prolonged exercise there is a general catabolic reaction that persists for hours, as judged by the proportion of energy derived from protein, carbohydrate and fat; by the ketone bodies, nonesterified fatty acids, glucose and lactate in the plasma; and by the ketone bodies, titratable acidity and total nitrogen in the urine. (Author)

AD-285 012 Div. 16
(TISTB/MD) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
EFFECT OF COLD ACCLIMATION ON VITAMIN A METABOLISM,
by Edith Porter and E. J. Masoro. May 62, 4p. incl. tables, 7 refs. (Rept. no. AAL TDR 61-44)
(Proj. 8237-02; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 41(657)321)
Unclassified report

DESCRIPTORS: *Exposure, *Vitamin A, *Food, Liver, Laboratory animals, Consumption.

Hepatic vitamin A levels are much higher in cold-acclimated rats than in rats maintained at 25 C. This increase in hepatic vitamin A content does not stem from a sparing action induced by cold acclimation but is rather a simple corollary of the increased food consumption that accompanies cold exposure. Moreover, evidence is presented which suggests that the amount of vitamin A needed for rats to live at 0 to 2 C is not markedly greater than the amount needed to live at 25 C. (Author)

AD-285 013 Div. 16
(TISTB/MD) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
A STUDY OF THE LIPOGENIC INHIBITORY MECHANISMS INDUCED BY FASTING,
by E. J. Masoro, H. M. Korchak, and Edith Porter. May 62, 18p. illus. tables, 18 refs. (Rept. no. AAL TDR 61-45)
(Proj. 8237-02; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 41(657)321)
Unclassified report

DESCRIPTORS: *Lipids, *Starvation, *Enzymes, *Liver, Stimulation, Inhibition, Laboratory animals, Biochemistry, Synthesis.

Cytoplasmic particles from livers of fasted rats inhibit fatty acid synthesis by the hepatic supernatant enzyme system. In contrast, the cytoplasmic particles from livers of fed rats stimulate lipogenesis by the supernatant system. The microsomes from livers of fasted rats have the most marked inhibitory activity, which is associated with a material that is protein in nature. The inhibition occurs at the acetyl carboxylase step. Restriction of the amount of ATP available for this reaction by means of an increased microsomal ATPase is probably an important part of the inhibitory action. A microsomal interaction with the particle-free supernatant is also involved in the inhibitory action. The possible physiological significance of lipogenic inhibitors is discussed. (Author)

AD-285 014 Div. 16
(TISTB/MD) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
FATTY ACID METABOLISM DURING NOREPINEPHRINE INDUCED THERMOGENESIS IN THE COLD ACCLIMATIZED RAT,
by John P. Hannon and Anna M. Larson. May 62, 15p. incl. illus. table, 18 refs. (Rept. no. AAL TDR 61-48)
(Proj. 8237-02)
Unclassified report

DESCRIPTORS: *Epinephrine, *Exposure, *Heat production (Biology), *Fatty acids, Liver, Body temperature, Oxygen consumption, Metabolism, Laboratory animals, Muscles, Biochemistry, Oxidation.

The biochemical mechanisms underlying norepinephrine-induced thermo-genesis and the possible relationship of this hormone to nonshivering thermogenesis were investigated in cold-acclimatized rats. An intravenous infusion of l-norepinephrine caused a marked fall in the Respiratory Quotient, indicating a predominance of fat oxidation. Cold-acclimatized animals had higher liver and blood levels of nonesterified fatty acids (NEFA) than control animals, but norepinephrine infusions raised blood NEFA to the same level in both groups. Cold acclimatization was associated with an increased capacity to turn over NEFA, as indicated by an elevated capacity for the oxidation of NEFA in the liver tissue and increased sensitivity of epididymal fat to a norepinephrine-induced release of NEFA. Continuous measurements of respiratory gas exchange during acute cold exposure (5 and -15 C) showed the Respiratory Quotient to be reduced only during the transition stage from a lower to a higher metabolic steady state. Norepinephrine is not the sole mediator of non-shivering thermogenesis. Rather, it probably acts through a stimulation of NEFA metabolism to rapidly increase the heat production. (Author)

AD-285 015 Div. 16
(TISTB/MD) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
INFLUENCE OF PRIOR COLD EXPOSURE ON PERIPHERAL VASCULAR REACTION ON RABBIT EAR INDUCED BY ABRUPT COLD EXPOSURE,
by N. Honda, W. V. Judy, and L. D. Carlson.
May 62, 9p. incl. illus. tables (Rept. no. AAL TDR 61-50)
(Proj. 8237-39; In cooperation with Kentucky U., Lexington, Contract AF 41(657)335)
Unclassified report

DESCRIPTORS: *Exposure, *Blood vessels, *Body temperature, Laboratory animals, Rabbits, Ear, Constriction.

The influence of prior cold exposure on vasoconstriction induced by abrupt cold exposure was studied in the rabbit ear. Dutch breed rabbits were individually caged outdoors (maximum temperature, 21 C; minimum, -7 C; average, 5.9 C) and a control group was kept at 27 C over a five month period. Three groups of New Zealand rabbits were divided to be exposed to 27 C, 5 C, and 5 C day and 27 C night temperatures. Rectal, ear and body surface temperatures, heat loss from the ear, and blood flow in the ear were recorded at 27, 23 and 5 C. In general, at 23 and 27 C there was no difference between the groups of rabbits. After one hour exposure to 5 C, outdoor and 5 C groups had a low blood flow to the ear and had no decline in rectal temperature. Other groups, however, had a decrease in rectal temperature and higher ear blood flow. After 12 to 18 hours exposure to 5 C, rectal temperature returned to original values in the 27 C animals; blood flow to the ear decreased slightly. Ear blood flow in outdoor and 5 C rabbits increased during this period. (Author)

AD-285 016 Div. 16
(TISTB/MD) OTS price $4.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
THE PROPERDIN SYSTEM IN HOST RESISTANCE,
by Fred Miya, William Wu, and Stanley Marcus.
Apr 62, 39p. incl. illus. table, 128 refs. (Rept. no. AAL TDR 61-51)
(Proj. 8241-32; In cooperation with Utah U., Salt Lake City, Contract AF 41(657)311)
Unclassified report

DESCRIPTORS: *Properdin, *Bibliography, Immunology, Literature, Analysis, Separation, Infections, Virus diseases, Cancer, Radiation effects, Zymosan.

Evidence is reviewed through 1960 that supports the existence in mammalian sera of the serum protein fraction named properdin. Characteristics of the controversy concerning the distinctions between antibody and properdin are reviewed. Methods of isolation and assay, as well as problems related to assay, are considered and evaluated. The interactions of properdin are described with various substances, such as polysaccharides, divalent cations, complement, and complement fractions. The reported effects of properdin on different types of bacteria, viruses, and neoplasms, in culture or in animals, are evaluated in conjunction with other nonspecific defense mechanisms which have been described. Absence of information of the mechanism of action of properdin in host resistance indicates need for investigation in this area. (Author)

AD-285 017 Div. 16
(TISTB/AW) OTS price $2.60

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
SURGERY - ARMY PROSTHETICS RESEARCH.
Annual progress rept., 1 July 61-30 June 62.
30 June 62, 20p. refs.
(Proj. 6X59-01-001-04)
Unclassified report

DESCRIPTORS: *Prosthetics, Artificial limbs, Hands, Arms, Legs, Face, Arteries, Cartilage, Nylon, Polymers, Dacron, Acrylic resins, Arthoplasty, Elastomers, Laminates, Textiles, Epoxy resins.

AD-285 094 Div. 16, 20
(TISTB/CCH) OTS price $5.60

Naval Radiological Defense Lab., San Francisco, Calif.
THE RADIOBIOLOGY OF TEETH,
by D. J. Kimeldorf, D. C. Jones, and T. J. Castanera. 31 Aug 62, 55p. 71 refs. (Rept. no. NRDL-TR-579)
Unclassified report

DESCRIPTORS: *Radiobiology, *Teeth, X rays, Radiation effects, Cells (Biology).

The literature regarding radiation effects upon teeth was summarized and reviewed. Radiation effects upon teeth were observed in a variety of species including man. Where sufficient data are available to form a judgment it appears that the pattern of alteration is similar among species. The effects are dependent upon exposure factors and the stage of tooth development at the time of irradiation. If the dose is massive, the effects may also involve damage to the tooth supportive structures. Radiation alters or destroys those odontogenic cells which are actively proliferating and differentiating at the time of exposure. If irradiation occurs before the formation of hard tissues, it may destroy the tooth bud. Radiation at a later stage in development may alter differentiation or arrest further growth. The severity of the effect is dependent upon the radiation dose. Mature tooth structures are affected primarily by relatively large doses although histologic evidence of damage in growing teeth of rodents may be detected with 25 r of X rays. The patterns of injury and regeneration for the various tissues of the tooth are presented. In terms of radiobiological mechanisms it

appears that direct radiation injury to teeth consists primarily of an interference with mitosis of proliferative tissues and the impairment of metabolic processes in differentiating cells. (Author)

AD-285 175 Div. 16, 28
(TISTB/CCH) OTS price $2.60

Buffalo U., N. Y.
SOME PERCEPTUAL AND PHYSIOLOGICAL ASPECTS OF UNIFORM VISUAL STIMULATION.
Final technical rept. 15 June 57-28 Feb 62, by Walter Cohen. 28 Feb 62, 25p. incl. tables, refs.
(Contract DA 49-007-md-866)
Unclassified report

DESCRIPTORS: *Visual perception, Physiology, Motor reactions, Target recognition, Reaction time, Space perception, Stimulation.

A series of experiments concerned with the effects of uniform visual stimulation (Ganzfeld) on young adult observers (university students) are described. Both physiological changes and deficits in perceptual and psychomotor performance were studied. The EEG records indicated an increase in alpha activity during uniform stimulation, especially during blank-out (a cessation of visual experience resulting from uniform stimulation). Other physiological changes consisted of an increase in electrical skin resistence, accommodation, and pupil size. The relationship between attention and arousal level was curvilinear. Results of studies of disjunctive reaction time, figure reversal and auditory discriminations in the Ganzfeld indicated losses in attention even after short periods of exposure. Form recognition was greatly interfered with by uniform stimulation and completely eliminated during blank-out. Movement perception and spatial orientation were interfered with in the Ganzfeld. The complexity of the target and set of the Os determined the extent of interference. The problem of individual differences in susceptibility to interference from uniform stimulation and methods for minimizing this deficit are discussed. (Author)

AD-285 187 Div. 16
(TISTB/MS) OTS price $2.60

Office of Technical Services, Washington, D. C.
AZERBAYDZHAN MEDICAL TRANSLATIONS - USSR.
2 Oct 62, 20p. incl. illus. 14 refs. (Rept. no. JPRS 15538)
Unclassified report

DESCRIPTORS: *Drugs, *USSR, *Cerebral cortex, Electroencephalography, Stimulation, Alkaloids, Nervous system, Medical research, Electric potential.

This rept. includes:
THE PROBLEM OF THE EFFECT OF SOLASODINE ON THE BIOELECTRIC POTENTIAL OF THE CEREBRAL CORTEX,
by Kh. I. Seyfulla. 1962 (Trans. from Azerbaydzhanskiy Meditsinskiy Zhurnal (Azerbaydzhan Medical Journal) Baku, No. 4, pp. 18-22, 1962)

THE SECOND ALL-UNION CONFERENCE OF SURGEONS, TRAUMATOLOGISTS, AND ANESTHESIOLOGISTS IN THE CITY OF BAKU,
by Z. M. Mamedov and G. K. Alnev. 1962 (Trans. from Azerbaydzhanskiy Meditsinskiy Zhurnal (Azerbaydzhan Medical Journal) Baku, No. 4, pp. 98-105, 1962)

Solasodine in 0.5 mg/kg doses, in single inductions, activates the biopotentials of the cerebral cortex. Mg 0.5 Mg/kg solasodine induction by the 5th and 10th day changes the bioelectric activity of the cortex in relation to the initial ground of the EEG. Single and multiple induction of solasodine in doses of 5 mg/kg decreases the electric activity of the animal cerebral cortex. (Author)

AD-285 212 Div. 16, 29
(TISTB/AW) OTS price $1.75

Office of Research Administration, U. of Michigan, Ann Arbor.
INVESTIGATION OF RELATIVE MICROBIOLOGICAL RESPONSE TO VARYING TYPES AND METHODS OF APPLICATION OF IONIZING RADIATION.
Rept. no. 8 (Final), 1 Dec 59-30 Nov 61, by Lloyd L. Kempe and J. T. Graikoski. 30 Nov 61, 63p. incl. illus. tables, 9 refs.
(Contract DA 19-129-qm-1532)
Unclassified report

DESCRIPTORS: *Clostridium botulinum, *Radiation effects, Gamma rays, Microorganisms, Spores, Viability, Toxicity, Beef, Dose rate.

The influences of field strength, radiation energy, and intermittent irradiation on the lethality of gamma rays for Clostridium botulinum 62A and 213B spores were evaluated. Three cobalt-60 and one cesium-137 radiation sources were used. Variation in field strengths from 0.002 to 2.31 megarad per hour were utilized in the cobalt-60 sources. None of these variables was found to affect significantly the lethality of gamma rays for C. botulinum spores. The results show that data obtained on moderately weak radiation sources can be extrapolated for design purposes to field strengths of at least 2.31 megarad per hour; that interruption of irradiation for short intervals has little effect; and that cesium-137 should be essentially as effective as cobalt-60 sources for food-sterilization purposes. (Author)

AD-285 220 Div. 16
(TISTB/MS) OTS price $.75

Life Support Systems Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
WATER RECOVERY FROM PHYSIOLOGICAL SOURCES FOR SPACE APPLICATIONS.
Final report on Equipment for Life Support in Aerospace,
by A. R. Slonim, A. P. Hallam and others.
July 62, 27p. incl. tables, 42 refs.
(Proj. 6373)
(MRL TDR 62-75) Unclassified report

DESCRIPTORS: *Closed-cycle ecological systems, *Water, *Urine, Metabolic products, Spaceships, Space environmental conditions, Pyrolysis, Vacuum systems, Test methods, Recovery, Processing.

The recovery of water from urine and other liquid wastes is reviewed. Various techniques of water recovery are described under the following categories: change of phase (e.g., liquid-solid), membrane, diffusion, and combination (e.g., vapor treatment-distillation) processes. Logistics considerations for manned space systems are discussed. Generally, all water recovery techniques are deficient in one or more factors for space vehicle applications. Some require orientation of space craft, much power, large radiation panels, replaceable parts, complex mechanical design and/or considerable chemical treatment of water. Several processes appear promising, such as vacuum pyrolysis, electrolysis combined with combustion, and freeze drying. Of these, the vacuum pyrolysis method, in which potable water was produced from mixed human wastes and

wash water, is operationally the most advanced. Nevertheless, no process has been developed that is fully operational at this time. (Author)

AD-285 261 Div. 16
(TISTB/MD) OTS price $8.60

Kent State U., Ohio.
THE EFFECT OF DRUGS ON PHYSICAL PERFORMANCE IN ANIMALS.
Annual progress rept., 1 Jan-31 Dec 62,
by Charles G. Wilber. 1 Oct 62, 1v. incl. illus. tables, refs.
(Contract DA 49-193-md-2216)
Unclassified report

DESCRIPTORS: *Mathematical analysis, *Hallucinogens, *Pharmacology, *Behavior, *Toxicity, *Dosage, *Time, Laboratory animals, Chlorpromazine, Lysergic acid derivatives, Aquatic animals, Cancer, Drugs, Swimming, Cannabinols, Temperature, Man, Equations.

This report includes:
THE BIOLOGY OF WATER TOXICANTS IN SUBLETHAL CONCENTRATIONS, by Charles G. Wilber. 1962, 28p. incl. illus. tables.

SOME THOUGHTS ON PSYCHOTOGENIC DRUGS,
by Charles G. Wilber. 1962, 30p.

THE EFFECT OF LYSERGIC ACID DIETHYLAMIDE ON SWIMMING TIME IN ALBINO MICE,
by Charles G. Wilber and J. A. Burke. 1962, 10p. incl. tables.

Contents: The effects of drugs on physical performance in animals; The biology of water toxicants in sublethal concentrations; Some thoughts on psychotogenic drugs; and The effect of lysergic acid diethylamide on swimming time in albino mice.

AD-285 301 Div. 16
(TISTB/AW) OTS price $1.60

London U. (Gt. Brit.).
HYPOTHALMIC AND FOREBRAIN AREAS RESPONSIBLE FOR CONTROL OF SECRETION OF THYROTROPHIC AND ADRENOCORTICOTROPHIC HORMONES.
Final summary rept., 1 May 61-30 Apr 62,
by G. W. Harris. 30 Apr 62, 10p. 3 refs.
(Contract AF 61(052)454)
Unclassified report

DESCRIPTORS: *Hypothalamus, *Pituitary hormones, *Secretion, *Acth, *Thyroid hormones, Control, Testes, Hormones, Blood chemistry, Measurement, Nervous system, Feedback, Testosterone, Stimulation, Electricity, Estrogens.

Projects concerned: (1) The control the hypothalamus exerts over thyrotrophic hormone secretion from the anterior pituitary gland, (2) The development of an assay method for measuring the concentration of thyrotrophic hormone in blood, and the application of this method to several of the other individual projects, (3) The humoral mechanism by which the hypothalamus controls the secretion of thyrotrophic hormone from the anterior pituitary gland, (4) The humoral mechanism by which the hypothalamus control the secretion of gonadotrophic hormone (Luteinizing hormone), (5) The effects exerted on the mature central nervous system by the feed-back action of gonadal hormones, and (6) The inductive or organizing effect exerted on the immature central nervous system by the feed-back of gonadal hormones. (Author)

AD-285 323 Div. 16
(TISTB/SAT) OTS price $1.60

Army Environmental Hygiene Agency, Army Chemical Center, Md.
SEROLOGICAL AND VIROLOGICAL STUDIES OF ARTHROPOD-BORNE ENCEPHALITIS IN THE CHESAPEAKE BAY REGION.
Final rept., 1 July 61-31 Aug 62,
by Frank G. Favorite, Harland W. Fowler, Jr. and Donald R. Whitehead. 31 Aug 62, 11p. incl. illus. (Rept. no. RCS-MEDDH-288)
(Proj. 6X61-01-001)
Unclassified report

DESCRIPTORS: *Encephalitis viruses, *Equine encephalomyelitis, *Virus diseases, *Microbiology, *Serum, Blood, Antibodies, Mosquitoes, Epidemiology, Birds, Collecting methods, Reptiles, Mammals, Ticks, Insects.

This study was designed as a year-round surveillance program for the detection of Eastern encephalitis virus in the upper Chesapeake Bay Region. Human, equine, and avian outbreaks of eastern encephalitis had occurred to the north of the study area (New Jersey 1959) and to the south (Maryland 1959-1960). Since investigations of these outbreaks were necessarily ex post facto, the questions of virus origin, mode of transmission, and vector(s) remain, by-and-large, unanswered. Collections of bird bloods, other animal bloods, and engorged and unengorged arthropods exceeded the laboratory's capability for routine processing. This operation was intended: (a) to determine the incidence of arbor-viremia within probable host populations and (b) to store, frozen, a year-round sampling of probable arthropod vectors. Thus, if an outbreak occurs in the vicinity, a careful laboratory examination can be accomplished on specimens collected when transmission related to an outbreak was defind in time. Precipitin testing of freshly engorged arthropod specimens for determination of host also was planned. Antisera to proteins from various animals were to be prepared in rabbits or other suitable host. (Author)

AD-285 329 Div. 16
(TISTB/SAT) OTS price $2.60

Aerospace Information Div., Washington, D. C.
SOVIET MANNED SPACE FLIGHT INDIVIDUALS AND COMPONENTS OF THE USSR SPACE COMMAN SYSTEM (BASED ON SOVIET OPEN LITERATURE 1961-1962).
12 Sep 62, 25p. incl. illus. 70 refs. (AID rept. no. 62-129)
Unclassified report

DESCRIPTORS: *Space flight, *USSR, *Astronautics, Research program administration, Training, Literature, Manned, Personnel.

This report contains information on the personalities who have been described or mentioned in connection with the Soviet manned space-flight program in newspaper articles and periodicals published between 8 February and 11 April 1962. Also presented is information on the cosmonaut training system and the analyst's comments and deductions drawn from the information used as the basis of this report. The major portion of the data used in the Supplement was found in a serialized article entitled ''Cosmonauts,'' written by Colonel Ye. A. Petrov and published in 14 installments in Krasnaya zvezda between 6 February and 22 March 1962. According to an editorial note which appeared with one of the installments, this serialized work is only a part of a larger article now being prepared by Colonel Petrov. (Author)

Division 16 - MEDICAL SCIENCES

AD-285 396 Div. 16
(TISTB/AW) OTS price $2.60

Naval Medical Field Research Lab., Camp Lejeune, N. C.
FACILITIES AND PROGRAMS,
Sep 62, 19p. incl. illus.
Unclassified report

DESCRIPTORS: *Medical laboratories, *Military facilities, *Naval medicine, *Naval research laboratories, Marine Corps, Naval shore establishments, Body armor, Manufacturing methods, Virus diseases, Urinary tract, Infections, Burns, Thermal stresses, Instrumentation, Dental equipment.

The mission of the Naval Medical Field Research Laboratory as prescribed by the Chief of Naval Operations and as stated in the Basic Naval Establishment Plan is to conduct research, development and testing in the medical, dental and allied sciences, with particular emphasis on problems of field and amphibious medicine. The various departments and their respective tasks and requirements are listed. (Author)

AD-285 544 Div. 16
(TISTB/MD) OTS price $1.60

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
ADAPTOR FOR RESUSCITATION APPARATUS.
Rept. for Aug-Sep 62,
by Carl A. Nielson. Sep 62, 14p. incl. illus.
(Technical rept. no. 6219)
(Proj. 6X59-01-001-04)
Unclassified report

DESCRIPTORS: *Respirators, Design, Medical equipment, Adapters.

An adaptor or connecting mechanism between the tracheostomy tubes of current manufacture and other elements of the resuscitation apparatus used during the emergency transport of patients from the site of the accident to the treatment center was developed which satisfied the following 3 criteria: (1) adaptable to each size of tracheostomy tubes, (2) self-supporting, and secure in its attachment, requiring no external aid, and (3) amenable to the temperatures encountered during sterilization by autoclave without distortion or destruction. (Author)

AD-285 545 Div. 16
(TISTB/MD) OTS price $.50

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
PHONOCARDIOGRAMS OF YOUNG ADULT MACACA MULATTA.
Final rept., May-July 61 on Biomechanics of Aerospace Operations,
by F. R. Robinson and R. L. Hamlin. June 62,
6p. incl. illus. tables, 2 refs.
(Proj. 7231; In cooperation with Ohio State U., Columbus)
(MRL TDR 62-62) Unclassified report

DESCRIPTORS: *Cardiographs, *Electrocardiography, Laboratory animals, Primates, Heart, Sound.

Phonocardiograms were recorded and analyzed for thirteen healthy macaca mulatta. Lead aVF electrocardiograms and phonocardiograms were recorded simultaneously. Mean values and ranges for the following parameters were analyzed: RR interval, PR interval, duration between onset of P-wave and onset of first heart sound, duration between onset of QRS and onset of first heart sound, duration of first heart sound, number of vibrations in first heart sound, duration of mechanical systole, duration of second heart sound, number of vibrations in second heart sound, duration of mechanical diastole. The first heart sound had a mean duration of 0.074 second with a mean frequency of 90 cps. The second heart sound which was lower in magnitude and duration had a mean duration of 0.038 second with a mean frequency of 94 cps. Diastolic murmurs were recorded in four animals. (Author)

AD-285 546 Div. 16
(TISTB/MD) OTS price $1.10

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
FIXTURE FOR FITTING ABOVE-KNEE PLASTIC SOCKETS USING ADJUSTABLE BRIM TECHNIQUE.
Rept. for Oct 61-Aug 62,
by T. J. Bushey, M. J. Orloski and others.
Aug 62, 5p. (Technical rept. no. 6220)
(Proj. 6X59-01-001-04)
Unclassified report

DESCRIPTORS: *Artificial limbs, Prosthetics, Amputation stumps, Medical equipment, Design, Casting.

A cast-taking device was fabricated which is to be used in taking impressions of above-knee stumps and in the construction of soft end total-contact sockets for above-knee prostheses. This device is used to hold, in proper position in relation to the stump, a series of adjustable brims which are of average quadrilateral shape. (Author)

AD-285 552 Div. 16
(TISTB/CCH) OTS price $.50

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
VISUAL ACUITY IN RELATION TO BODY ORIENTATION AND G-VECTOR.
Final rept., Sept-Nov 61 on Human Performance in Advanced Systems,
by Leroy D. Pigg and William N. Kama. July 62,
14p. incl. illus. tables, 6 refs.
(Proj. 7184)
(MRL TDR 62-74) Unclassified report

DESCRIPTORS: *Visual acuity, Weightlessness, Acceleration, Stress (Physiology), Test equipment.

The Armed Forces Vision Tester, fitted with checkerboard targets, was used in tests of visual acuity under viewing conditions involving various combinations of gravity effects. Twenty-four subjects were tested for left, right, and binocular acuity of near and far vision in each of four body positions: standing upright, prone, supine, and inverted upright. The latter condition effectively produced -1 G acceleration. Intercomparisons of scores from these positions form the basis for useful generalizations concerning the effects on visual acuity of various acceleration environments, including 0 G. By comparison with their acuity at 1 G, subjects experience a decrement at -1 G of approximately 15%. This is comparable to the decrement found by other investigators at 3 G's. Since both -1 G and 3 G's are 2 G-units removed from 1 G, it appears that equal changes in either direction from the normal acceleration environment produce equal losses in visual acuity as a function of the amount of change. This conclusion is supported by results of a previous study of acuity at 0 G, in which a small but statistically significant decrement comparable to that at 2 G's was found. (Author)

AD-285 570 Div. 16, 28
(TISTB/MD) OTS price $5.60

Hearing and Communication Lab., Indiana U., Bloomington.
CUEING SIGNALS AND FREQUENCY UNCERTAINTY IN AUDITORY DETECTION.
Technical report on Investigation of Research Concerning Auditory Detection and Recognition of Signals by Human Listeners,
by Gordon Z. Greenberg. 27 Apr 62, 47p. incl. illus. tables, 16 refs.
(Contracts AF 19(628)266 and AF 19(604)1962)
(ESD TDR 62-38) Unclassified report

DESCRIPTORS: *Auditory perception, Man, Audiofrequency, Auditory signals, Auditory thresholds, Psychoacoustics, Sensory perception, Thesis.

The cueing signal was relatively ineffective as an aid to detection during experiments when only a single frequency was employed. In other experiments, when additional frequency uncertainty was introduced by varying the relationship between the frequency of the cueing signal and that of the signal during the detection interval, detectability increased in the presence of the cueing signal. The results of these experiments do not support a simple sensory facilitation as the explanation for the increased detectability with the cueing signal. The results do support a description of the human listener's performance, by a narrow-band observer model rather than by a broad-band observer model. The narrow-band observer model is supported further by consideration of the responses identifying the frequency of the cueing signal. Detectability during the detection interval was shown to be dependent upon the correctness of the frequency identification response. The aid to detection reported here would not be expected to greatly reduce a sizeable initial uncertainty. The increases in detectability, due to the introduction of the cueing signal were each of a magnitude less than 1 db. (Author)

AD-285 571 Div. 16
(TISTB/MD) OTS price $1.10

New York Medical Coll., N. Y.
(No title).
Annual progress rept., 1 Nov 61-1 Sep 62.
1 Sep 62, 5p.
(Contracts Nonr 275400 and Nonr-275401)
Unclassified report

DESCRIPTORS: *Diabetes, *Pancreas, *Transplantation, *Hormones, *Blood chemistry, *Thymus gland, Hamsters, Laboratory animals, Corticosteroids, Insulin, Alloxan, Blood sugar, Blood volume, Blood proteins, Cholesterol, Amino acid.

Included are abstracts of the following journal articles from the New York Medical College: (1) The effect of hormones on pancreatic transplants in both normal and diabetic hamsters. (2) Insulin's effect on the recovery of hamsters from alloxan diabetes. (3) Blood volume, total protein and total cholesterol in normal and diabetic hamsters. (4) A technique for the localization of transplants in the hamster cheek pouch. (5) The effect of pancreatic homografts on the blood of normal and diabetic hamsters. (6) The effects of D-L ethionine on the pancreas of normal and pregnant hamsters. (7) The effect of serial transplantation on the growth of neonatal pancreas in the hamster. Current investigations and those proposed for the future include studies of the effect of ethionine on neonatal pancreases implanted in hamster cheek pouches, the effect of environment on neonatal pancreas transplants by placing them in mesenteries of diabetic hamsters, and the effect of thymectomy on carbohydrate metabolism in normal and diabetic animals and on the growth of neonatal pancreas transplants.

17. METALLURGY

AD-284 535 Div. 17
(TISTM/MS) OTS price $2.60

Watertown Arsenal Labs., Mass.
EFFECT OF SOLIDIFICATION VARIABLES ON MECHANICAL PROPERTIES OF CAST STEEL,.
Rept. on Research of Materials for Lightweight Construction,
by David A. Cooling and Paul J. Ahearn. July 62, 21p. incl. illus. tables, 8 refs. (Rept. no. WAL TR 311.1/1)
(Proj. 59332007)
Unclassified report

DESCRIPTORS: *Cast steel, Heat treatment, Processing, Microstructure, Microanalysis, Tensile properties, Metallurgy, Measurement, Mechanical properties.

True stress-true strain measurements of specimens from modified AISI 4340 steel cylindrical castings show variations in mechanical properties with respect to solidification time; tensile strength is reduced somewhat by increased solidification time, and there is considerable corresponding loss of ductility. It is shown that the influence of freezing time changes through the casting radius. For short freezing times only ductility is affected, but for longer freezing times ductility and tensile strength are affected. Specimens from selected castings are examined using an electron-beam microanalyzer. It is shown that microsegregation is equally severe in small distances across equiaxed grains as it is for much greater distances along dendrite arms in columnar grains. No apparent reduction in heterogeneity is obtained by homogenizing treatments. Microporosity distribution exhibits maxima at the end of columnar growth and at the casting center. Minimum microporosity in each casting is obtained near the surface; however, the level of microporosity is considerably influenced by external pressure during solidification. The loss of ultrahigh-strength steel properties with increased solidification time appears to be somewhat dependent upon nonmetallic inclusions and is strongly affected by other factors, including microsegregation and microporosity. (Author)

AD-284 577 Div. 17
(TISTM/MS) OTS price $3.60

Universal-Cyclops Steel Corp., Bridgeville, Pa.
INFAB PROCESSING OF TZM SHEET.
Interim technical engineering rept. no. 2, 17 May-17 Aug 62,
by F. R. Cortes and W. A. McNeish. Aug 62, 25p. incl. illus. tables.
(Contract AF 33(657)8495)
(ASD TR 7-786, vol. 2) Unclassified report

DESCRIPTORS: *Molybdenum alloys, Molybdenum castings, Titanium, Zirconium, Sheets, Processing, Forging, Extrusion, Castings.

Two ingots of Mo + 0.5% Ti + 0.1% Zr were melted and evaluated. Macros, micros, hardness, and chemistry data are presented. The 6 in.

ingot and the extruded product, 4-1/2 in. diameter, from the 8 in. ingot were prepared into forging billets for the Phase III program. This constitutes the completion of the Phase II effort. (Author)

AD-284 582 Div. 17, 4
(TISTM/EJH) OTS price $8.60

Baylor U., Waco, Tex.
THE ABSORPTION OF ELECTROLYTICALLY GENERATED HYDROGEN BY IRON,
by Thomas C. Franklin and Fujio Matsuda.
June 62, 87p. incl. illus. refs. (Scientific rept. no. 1)
(Contract AF 19(604)8414, Proj. 6694)
(AFCRL 62-671) Unclassified report

DESCRIPTORS: *Iron, *Hydrogen embrittlement, *Hydrogen, *Electrodes, Adsorption, Oxidation, Surfaces, Electrolytic cells, Sodium compounds, Hydroxides, Additives, Reaction kinetics, Voltage, Electric currents, Iron.

A coulometric technique using a polarograph was used to study the sorption of H at Fe electrodes. This technique indicated that there was one form of H on the surface of the electrode, and that there were 2 forms of H absorbed in the electrode. The effects of solution additives on H absorption by Fe were studied and it was found that H absorption by Fe was a first order reaction with respect to the amount of the adsorbed H on the surface. An equilibrium was established between H adsorbed on the surface and H absorbed in the Fe. Embrittlement resulted from the second form of H and the first and third forms of H were non-damaging. (Author)

AD-284 750 Div. 17, 30
(TISTM/EJH) OTS price $1.60

Southern Research Inst., Birmingham, Ala.
AN INVESTIGATION OF THE CRACK-PROPAGATION RESISTANCE OF HIGH-STRENGTH ALLOYS AND HEAT-RESISTANT ALLOYS.
Bimonthly progress rept no. 10, 23 June-23 Aug 62, by P. C. Jenkins and J. D. Morrison. 19 Sep 62, 12p. incl. illus. tables, 2 refs.
(Contract NOw 61-0392-d)
Unclassified report

DESCRIPTORS: *Steel, Sheets, Mechanical properties, Tensile properties, Gages, Test methods, Reliability, Fracture (Mechanics).

Experiments with a compliance gage for measuring slow crack extension are described. It was found that at a temperature of 400 F a greater amount of slow crack growth occurs in the low-alloy steel--300M--than at other temperatures from 75 F to 800 F. At this same temperature (400 F) a minimum in net fracture strength and a maximum in ultimate tensile strength occur. Similar behavior at 350 F was noted for another low-alloy steel-AISI 4340. Replicate determinations of the fracture-toughness parameter, K sub c, from compliance-gage measurements of critical crack length indicate that a fair degree of reproducibility of K sub c values can be obtained by this method. Experiments with specimens of AISI 4340 steel have shown that crack lengths calculated from compliance-gage measurements agree well with actual measured crack lengths in the same specimens. (Author)

AD-284 814 Div. 17
(TISTM/JAB) OTS price $4.60

Wah Chang Corp., Albany, Oreg.
REDUCTION AND CONSOLIDATION OF SUPERIOR QUALITY MOLYBDENUM ALLOYS.
Interim rept., 1 May-30 Aug 61,
by Socrates S. Christopher and James Wong.
30 Aug 61, 38p. incl. illus. tables (Rept. no. WCA 1001-6)
(Contract NOa(s) 60-6046-c)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, Electron beams, Single crystals (Metallurgy), Crystallization, Tensile properties, Microstructure, Hydrogen, Reduction, Melting.

Heat treating studies on single crystals swaged 95% at 800 F indicated a recrystallization temperature between 1200 and 1300 F after one-half hour at temperature. This is the lowest recrystallization temperature reported for molybdenum and is attributed to the high purity obtainable by electron-beam melting. Three electron-beam-melted, hydrogen-reduced molybdenum billets were extruded. Sheets rolled to .030 inch from these extrusions had recrystallization temperatures between 1200 and 1400 F. Room temperature tensile properties of the sheet showed a large dropoff in strength after a one-hour heat treatment at 1400 F. Elongation values for this material were between 30 and 40%. A one-hour heat treatment at 1800 F resulted in a sharp drop in tensile elongation. Bend test data revealed brittle fracture after the one-hour heat treatment at 1400 F. Electron-beam melted, hydrogen-reduced molybdenum which was arc melted to refine the grain size showed properties similar to commercial molybdenum. The recrystallization temperature for this material was in excess of 1800 F. This increase in recrystallization temperature is attributed to contamination during arc melting. (Author)

AD-284 815 Div. 17
(TISTM/JAB) OTS price $1.60

Wah Chang Corp., Albany, Oreg.
REDUCTION AND CONSOLIDATION OF SUPERIOR QUALITY MOLYBDENUM ALLOYS.
Interim rept., 1 May-31 Aug 60,
by Edmund Baroch, Stephen Yih, and James Wong.
30 Sep 60; 7p. incl. illus. tables (Rept. no. WCA 1001-2)
(Contract NOa(s) 60-6046-c)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, Electron beams, Hydrogen, Reduction, Powder alloys, Hardness, Chemical analysis.

Thermitic reduction of molybdenum trioxide with calcium was successfully scaled-up and reguli weighing 50 pounds each were produced in a 14-inch diameter bomb. Techniques were developed for the electron beam melting of hydrogen-reduced molybdenum powder. Although this material contains low interstitial elements, it exhibited severe grain boundary brittleness. Physical properties of these single crystals are being determined. The electron beam melting of the thermitically-reduced molybdenum presented difficulties; primarily because of the melting configuration. The use of a remote electron beam source will be attempted to overcome power interruptions caused by volatilization of the occluded free calcium metal and calcium oxide. Additional future studies will include attempts to refine the as-cast grain size through the addition of grain inhibitors during the melting operation. (Author)

AD-284 817 Div. 17
(TISTM/JAB) OTS price $2.60

Wah Chang Corp., Albany, Oreg.
REDUCTION AND CONSOLIDATION OF SUPERIOR QUALITY

MOLYBDENUM ALLOYS.
Interim rept., 1 Jan-28 Feb 61,
by Edmund Baroch, D. S. Fairgrieve and James Wong. 3 Apr 61, 11p. incl. illus. tables (Rept. no. WCA 1001-4)
(Contract NOa(s) 60-6046-c)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, Electron beams, Single crystals (Metallurgy), Electric arcs, Microstructure, Calcium, Reduction, Hardness, Chemical analysis, Melting.

A remote gun for the electron beam melting of molybdenum containing appreciable quantities of volatile impurities was fabricated and will be employed in the melting of calcium-reduced molybdenum. The leaching of calcium-reduced molybdenum in hydrochloric acid removed a large portion of the impurities and appreciably improved the arc melting characteristics. The low level of metallic impurities should be retained, although some interstitial contamination may result. Arc-melted ingots were produced using leached calcium-reduced, hydrogen-reduced, and electron-beam-melted starting material and will be fabricated to sheet for evaluation. (Author)

AD-284 832 Div. 17
(TISTM/JAB) OTS price $2.00

Climax Molybdenum Co. of Michigan, Detroit.
DEVELOPMENT OF WORKABLE MOLYBDENUM AND TUNGSTEN-BASE ALLOYS.
Rept. for Feb 61-Feb 62 on Metallic Materials,
by M. Semchyshen, Robert Q. Barr and G. G. Chesmar. June 62, 70p. incl. illus. tables, 7 refs.
(Contract AF 33(616)7930)
(ASD TDR 62-508) Unclassified report

DESCRIPTORS: *Molybdenum alloys, *Tungsten alloys, Casting, Crystallization, Mechanical properties, Tensile properties, Stresses, Hardness, Carbon, Extrusion, Microstructure.

A number of complex molybdenum-, molybdenum-tungsten-, and tungsten-base alloys were consolidated by the vacuum-arc-casting technique. Successful extrusions were realized from all of the vacuum-arc-cast ingots. Extrusion constants well above those of earlier experiments were measured, indicative of the good elevated-temperature strength and concomitant high resistance to extrusion of the materials studied. Rolled bars were studied from the standpoint of recrystallization behavior, transition temperature, tensile properties as a function of temperature and, to a limited extent, creep-rupture properties. A carbon synergism was studied in the alloys Mo + 3% Ti + 0.5% Zr and Mo + 25% W + 1.25% Ti + 0.1% Zr from the standpoint of elevated temperature strength. In the case of both alloys, the carbon contents yielding the highest elevated temperature strengths also resulted in the highest transition temperatures as measured by the tensile test. An alloy based on Mo-50% W, and containing 0.8% Ti and 0.3% Zr, displayed exceptionally high strengths at elevated temperatures. The tensile transition temperature of this material was, however, above room temperature. (Author)

AD-284 897 Div. 17, 4
(TISTM/REB) OTS price $5.60

Metals Research Lab., Case Inst. of Tech., Cleveland, Ohio.
KINETICS OF THE BAINITE REACTION IN ALLOY STEELS.
Final rept.,
by R. H. Goodenow and R. F. Hehemann. July 62, 51p. incl. illus. tables, 39 refs.
(Contract Nonr-76300, Proj. NR 031-471)
Unclassified report

DESCRIPTORS: *Steel, *Bainite, Chemical reactions, Temperature, Transformations, Reaction kinetics.

A study was made of the structure, reaction kinetics and mechanism of the bainite reaction in alloy steels. The kinetics of the over-all reaction are influenced significantly by prior thermal history. Transformation is retarded by prior transformation at a higher temperature in this range and stabilization of the bainite reaction, analogous to the stabilization of the martensite reaction, accompanies this treatment. Prior treatment at a lower temperature accelerates the bainite reaction and this acceleration can be removed by inserting an annealing treatment in the bay between the prior and the final isothermal transformations. This suggests that the acceleration effect results primarily from the ability of transformation strain to catalyse nucleation of the bainite reaction. A study of carbon enrichment of austenite and the carbide phase in bainite indicates that there is a fundamental difference between upper and lower bainite. It is suggested that variations in interface mobility are associated with the structural difference between upper and lower bainite. (Author)

AD-284 929 Div. 17, 15
(TISTP/WH) OTS price $3.60

Towne School of Civil and Mechanical Engineering, U. of Pennsylvania, Philadelphia.
ON SOME VARIATIONAL PRINCIPLES IN ANISOTROPIC AND NONHOMOGENEOUS ELASTICITY. II. A VARIATIONAL APPROACH TO THE THEORY OF THE ELASTIC BEHAVIOR OF POLYCRYSTALS,
by Z. Hashin and S. Shtrikman. June 62, 37p. incl. table, refs. (Technical rept. no. 2)
(Contract Nonr-55142)
Unclassified report

DESCRIPTORS: *Elasticity, *Crystals, *Deformation, *Shear stresses, Tensor analysis, Vector analysis.

In previous papers (AD-265 817) the authors established some new variational principles in the linear theory of elasticity for isotropic nonhomogeneous bodies with prescribed surface displacements. These have been applied to the theory of the elastic behavior of multiphase materials. Work is concerned with the generalization of these principles to anisotropic and nonhomogeneous elasticity and the establishment of similar variational principles for a body with prescribed surface tractions. The second part deals with the application of these variational principles to the theory of the elastic behavior of polycrystals. (Author)

AD-284 932 Div. 17, 26
(TISTM/REB) OTS price $2.60

Universal-Cyclops Steel Corp., Bridgeville, Pa.
MOLYBDENUM SHEET ROLLING PROGRAM.
Interim rept. no. 17, 26 Apr-25 July 62,
by W. A. McNeish. 25 July 62, 19p. incl. illus. table.
(Contract NOa(s) 59-6142-c)
Unclassified report

DESCRIPTORS: *Molybdenum alloy, *Sheets, Alloys, Manufacturing methods, Rolling mills.

The necessity for carbon in excess of .020 percent to acquire maximum uniform high temperature properties in Mo+0.5%Ti and TZM is demonstrated. TZM forging stock for Phase II has been prepared. (Author)

Division 17 - METALLURGY

AD-284 940 Div. 17
(TISTM/AW) OTS price $1.25

Watervliet Arsenal, N. Y.
FATIGUE CHARACTERISTICS OF OPEN-END THICK-WALLED CYLINDERS UNDER CYCLIC INTERNAL PRESSURE,
by T. E. Davidson, R. Eisenstadt, and A. N. Reiner. Aug 62, 53p. incl. illus. table, 7 refs. (Rept. no. WVT-R1-6216)
Unclassified report

DESCRIPTORS: *Fatigue (Mechanics), *Gun barrels, Pressure vessels, Thermal stresses, Heat treatment, Test methods, Hydrostatic pressure.

Thick-walled cylinder fatigue data due to cyclic internal pressure for open-end cylinders in the range of 1,000 to 100,000 cycles to failure and having a diameter ratio of 1.4 to 2.0 at a nominal yield strength of 160,000 pounds per square inch is presented. Also presented are effects of autofrettage on the fatigue characteristics of thick-walled cylinders. Autofrettage substantially enhances fatigue characteristics at stress levels below the corresponding overstrain pressure; the degree of improvement increasing with decreasing stress levels. The rate of improvement in fatigue characteristics increases significantly with diameter ratio in autofrettaged cylinders up to a diameter ratio of 1.8 - 2.0 and to a much smaller degree in the non-autofrettaged condition. The rate of improvement of fatigue characteristics above 2.0 is the same for both the autofrettage and non-autofrettaged cases. Thermal treatment of 675 F for 6 hours after autofrettage does not affect fatigue characteristics and there is a correlation between the cyclic stress level and the area and depth of the fatigue crack to the point of ductile rupture. The depth of the fatigue crack decreases with increasing cyclic stress level. A means for using data from a uni-directional tensile fatigue test to predict the fatigue characteristics of thick-walled cylinders is discussed. (Author)

AD-285 011 Div. 17
(TISTM/TCG) OTS price $1.25

Applications Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
TENSILE AND CREEP PROPERTIES OF A110-AT TITANIUM SHEET MATERIAL AT ELEVATED TEMPERATURES.
Final rept., June-Sep 60 on Materials Application,
by James O. Hachet and Edward L. Horne. July 62, 35p. incl. illus. tables, 2 refs.
(Proj. 7381; In cooperation with New England Materials Lab., Inc., Medford, Mass., Contract AF 33(616)6202)
(ASD TDR 62-524) Unclassified report

DESCRIPTORS: *Titanium alloys, *Sheets, *Creep, *Tensile properties, Heat treatment, Chemical analysis, Deformation, Stresses, Time, Fracture (Mechanics), Mechanical properties.

This investigation was made to determine creep properties at elevated temperatures of hot-rolled annealed sheet A110-AT titanium alloy. Tests were conducted at 800, 1000, and 1100 F on sheet specimens cut parallel to the direction of rolling. Differences in properties with respect to chemical composition of the material from two sources were small. The data includes ultimate tensile, tensile yield strength, and creep properties at each temperature. Ultimate tensile strengths varied from 132,000 psi at room temperature to 62,300 psi at 1100 F. Creep deformation becomes more rapid at the two higher temperatures indicating that 1000 F is close to the upper useful temperature limit of this alloy. There was marked scatter of the creep properties of the alloy at 1000 and 1100 F, but the average strength properties are good. (Author)

AD-285 104 Div. 17
(TISTM/EJH) OTS price $2.60

Massachusetts Inst. of Tech., Cambridge.
FINE STRUCTURE OF AUSTENITE PRODUCED BY THE REVERSE MARTENSITIC TRANSFORMATION,
by George Krauss, Jr. 1 Sep 62, 12p. illus. 11 refs. (Technical rept. 8; Rept. no. DSR 7618)
(Contract Nonr-184135)
Unclassified report

DESCRIPTORS: *Iron alloys, *Nickel alloys, *Martensite, *Austenite, *Phase transitions, Phase studies, Transition temperatures, Microstructure, Mechanical properties, Electron microscopy.

The fine structure introduced into austenite by the reverse martensitic transformation was investigated by transmission electron microscopy in an iron-33.5 w/o nickel alloy. Direct martensitic transformation induced by cooling to -195 C produces finely twinned martensite surrounded by retained austenite containing relatively uncomplicated dislocation arrangements. On rapid heating to 450 C, the reverse transformation replaces these structures with tangled and jogged dislocations in concentrations up to 10 to the 11th power per sq. cm., and thereby accounts for the marked strength increases observed in reversed austenite. In some previously martensitic areas of the reversed austenite, twins up to 5 microns in width are observed with standard metallographic techniques. Selected-area electron diffraction confirms the twinned nature of these structures, and it is found that the twins are quite imperfect and contain a high concentration of tangled dislocations. (Author)

AD-285 150 Div. 17, 26, 14
(TISTM/EJH) OTS price $5.60

General Dynamics/Fort Worth, Tex.
PROCESSING - SURFACE PREPARATION - DOW #17 ANODIZE PROCESS - BONDING HK-31 MAGNESIUM-THORIUM ALLOY - PROCESS VARIABLES - INVESTIGATION OF,
by L. E. Weltman. 10 Sep 62, 47p. incl. illus. tables (Rept. no. FGT-2000)
(Contracts AF 33(657)7248 and AF 33(600)32841)
Unclassified report

DESCRIPTORS: *Magnesium alloys, *Thorium alloys, *Adhesives, *Bonding, Corrosion inhibition, Coatings, Chromium compounds, Oxides, Electrodeposition, Anodes, Surfaces, Shear stresses, Failure (Mechanics), Elevons, Processing, Tests, Tables.

A proposed elevon wedge design requires the use of bonded magnesium-thorium alloy. The Dow #17 treatment applied to HK-31 magnesium-thorium alloy protects the surface of the alloy against corrosion and offers a potentially good surface for adhesive bonding. Adhesive bonding of Dow #17 treated HK-31 magnesium-thorium alloy was investigated. From the data obtained, it is concluded that a satisfactory surface for bonding with AF-31 is produced when HK-31 magnesium-thorium alloy is given the 'light' (60-65 volts end-point) Dow #17 treatment and primed with EC-1459 prior to bonding. Higher end point voltages do not produce a satisfactory bonding surface whether or not the primer is applied. (Author)

AD-285 152 Div. 17, 14, 1
(TISTM/TCG) OTS price $1.10

General Dynamics/Fort Worth, Tex.
EMPIRICAL DATA - DESIGN ALLOWABLES - BONDED ALUMINUM WING PANEL - USING FMS-0027-1C CORE AND FMS-0015-1 ADHESIVE - CONFIRMATION OF,
by R. L. Vader. 13 Sep 62, 7p. incl. illus. table (Rept. no. FTDM-2399)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Airplane panels, Bonding, Adhesives, Tensile strength, Shear stresses, Failure (Mechanics), Mechanical properties.

Research was conducted to provide empirical data from tests conducted on a bonded Al panel containing 6.1 lb/cu ft 5052 Al core and thin (FMS-0015-1) 422J adhesive. The ultimate load and mode of failure of each specimen were recorded. (Author)

AD-285 167 Div. 17, 27
(TISTM/TCG) OTS price $2.60

National Research Corp., Cambridge, Mass.
DEVELOPMENT OF TANTALUM-TUNGSTEN ALLOYS FOR HIGH PERFORMANCE PROPULSION SYSTEM COMPONENTS.
Quarterly progress rept. no. 11, 21 Mar-20 June 62,
by R. W. Douglass. 20 June 62, 20p. illus. tables.
(Contract NOrd-18787)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, *Tantalum alloys, *Tungsten alloys, Erosion, Carbonization, Carbides, Thickness, Methanes, Pressure, Tungsten, Hafnium, Alloys, Metals, Tests, Propellants, Surface properties, Deterioration, Preparation.

Carburized Ta-20 and 30W nozzles were fired with inconclusive results due to testing difficulties. A series of carburized Ta-10, 15, 20, and 30W nozzles were fired with a 6500F propellant. The Ta-30W nozzle showed the least erosion, 0.29 mil/sec.; however, the Ta-10W nozzle (.45 mil/sec.) was judged best of the series, based on uniformity of erosion and surface appearance. Analysis of carburizing tests of Ta-W alloys at 2100 to 2500C for times up to 10 hr. shows that both time and temperature promote carburization with temperature being most effective. Tungsten additions result in thicker outer carbides and tainner total carbide layers at all temperatures. Methane pressure and flow rate in the range 10 to 20 mm and 1 to 20 scfh appear to have little or no effect on carbide thickness. Microprobe analysis of carburized Ta alloys showed that W segregates to the matrix and away from the hemi-carbide, while Hf segregates from the matrix to the hemi-carbide. There is also a slight tendency for W to segregate away from the mono-carbide phase. (Author)

AD-285 180 Div. 17, 26
(TISTM/MS) OTS price $3.60

Little, Arthur D., Inc., Cambridge, Mass.
BASIC PARAMETERS OF METAL BEHAVIOR UNDER HIGH RATE FORMING.
Interim rept. no. 2 on Uniform Elongation to Failure at High Rates of Strain,
by P. C. Johnson, B. A. Stein and R. S. Davis. June 62, 36p. incl. illus. tables
(Contract DA 19-020-ORD-5239, Proj. 5B93-32-004)
(WAL TR 111.2/20-1) Unclassified report

DESCRIPTORS: *Aluminum, *Explosive forming, *Metals, Alloys, Tests, Elasticity, Wave transmission, Plasticity, Stresses, Tensile properties, Measurement, Hardening, Stainless steel, Steel, Titanium, Vanadium, Iron, Fracture (Mechanics), Mechanical properties.

Using the dynamic expansion of a ring, the uniform elongation to failure at high rates of strain has been measured for seven materials, by measuring the change in grid spacing on one surface of fractured rings. Values obtained using a mean initial strain rate of the order of 1000 per second are compared to the values obtained on specimens pulled to fracture at a mean strain rate of .001 per second. The dynamic uniform elongation to fracture was greater than the quasi-static value for materials of low ductility and somewhat less than the quasi-static value for the materials of high ductility. (Author)

AD-285 290 Div. 17
(TISTM/ODN) OTS price $2.60

General Dynamics/Fort Worth, Tex.
MATERIAL - HK31A MAGNESIUM ALLOY - MECHANICAL PROPERTIES OF,
by F. C. Nordquist. 22 Feb 56, 22p. incl. illus. tables (Rept. no. FGT-1452)
(Contracts AF 33(657)7248 and AF 33(038)21250)
Unclassified report

DESCRIPTORS: *Magnesium alloys, Heat treatment, Tensile properties, Stresses, Elasticity, Alloys, Temperature, Mechanical properties.

Specimens of Mg alloy were tested to determine the mechanical properties at 450, 650, 750, and 900 F after being held at these temperatures for two minutes, and the effect on the mechanical properties at 450 F after a two-minute exposure to 550, 750, and 900 F. The mechanical properties investigated were Ftu, Fty, Fcy, e, Et, and Ec. A standard high temperature tensile specimen was used for the tensile tests and a newly designed compression specimen was used for the compression tests. The testing showed that the material in the -T6 condition had better mechanical properties at test temperatures over 450 F than did the -H24 condition. The -T6 condition maintains a relatively high modulus of elasticity of 4.5 x 10 to the 6th power at 750 F, while the H24 condition is down to 1.7 x 10 to the 6th power. The ultimate strength at 450 F after a 900 F exposure for two minutes is the same for both the -T6 and H24 conditions. The recovery strength tests conducted at 450 F showed that the -H24 condition consistently had a higher yield strength than that of the -T6 material after short time exposures to various temperatures between 450 and 900 F. (Author)

AD-285 316 Div. 17, 26
(TISTM/ODN) OTS price $4.60

Wah Chang Corp., Albany, Oreg.
TANTALUM EXTRUSION PROGRAM.
Interim technical engineering rept. no. 4 on Phase 3, 25 Mar-25 June 62,
by M. D. McNabb. 25 June 62, 34p. incl. illus. tables, 5 refs.
(Contract AF 33(600)42396, Proj. 7-783)
(ASD Interim rept. no. 7-783, vol. 3)
Unclassified report

DESCRIPTORS: *Tantalum, *Tungsten alloys, *Extrusion, *Tantalum alloys, Materials, Lubrication, Coatings, Metals, Dies, Surfaces, Microstructure, Heating, Design, Machining, Zirconium compounds, Dioxides, Surface properties, Alloys, Microphotography, Electron beams, Steel, Processing, Ceramic coatings.

It was demonstrated that, although extrusion pressures generally exceed the normally recommended level of 180,000 psi, a T section of tar-

get dimensions can be extruded at 3200 F within the stress limitations of the extrusion tooling used on this project. The use of a molybdenum nose on one Ta-10W billet reduced upset pressure. A modification in lubrication technique, namely applying glass after heating the billet, and greater attention to die coating quality, resulted in improved extrusion surfaces. The presence of longitudinal striations on the better extrusions is indicative of localized die coating wear and further improvements are required in heating and lubrication practice to eliminate such defects. When extruding at 3200 F, the degree of recrystallization varies with extrusion ratio and position along the length of the extrusion. At 18.8:1 the degree of recrystallization increases from the nose to the tail of the extrusion. (Author)

AD-285 361 Div. 17, 26
(TISTM/EJH) OTS price $2.60

General Dynamics/Fort Worth, Tex.
PROCESS - PLATING - TIN ON ALUMINUM AND ALUMINUM ALLOYS - CHEMICAL AND PHYSICAL PROPERTIES - INVESTIGATION OF,
by W. L. Armstrong. 16 July 58, 23p. incl. illus. tables (Rept. no. FGT-1958)
(Contracts AF 33(600)36200 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Aluminum, *Aluminum alloys, *Tin coatings, *Electroplating, Electroplating solutions, Electrodeposition, Surfaces, Sodium compounds, Stannates, Magnesium alloys, Thorium alloys, Corrosion inhibitions, Tests.

Attractive, adherent tin platings can be produced on 2024-T6 and 7075-T6 aluminum alloys by utilizing the Alumon zincate immersion pretreatment followed by any one of the three tin plating baths (stannous fluoroborate, sodium stannate, stannous sulfate). The oxalic acid anodize pretreatment does not produce aluminum surfaces which are receptive to the electrodeposition of tin from any of the baths evaluated. The sodium stannate bath produces tin platings on 2024-T6 and 7075-T6 aluminum alloys which pass 200-hours salt spray exposure (with more than one pit per square inch surface area being basis for failure). These platings exhibit less porosity than platings produced from the stannous fluoborate bath, which in turn produces platings of less porosity than the stannous sulfate bath. Neither the fluobrate nor sulfate tin platings passed 200-hours salt spray exposure. Both tin plated aluminum alloys coupled to HK-31 magnesium-thorium alloy exhibit no corrosion after exposure to 100 hours immersion in a three-phase JP-4 - 3% salt water environment. (Author)

AD-285 364 Div. 17
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - 7079-T651 ALUMINUM ALLOY PLATE - ROOM AND ELEVATED TEMPERATURE PROPERTIES OF - DETERMINATION OF,
by R. C. Whiting. 2 Apr 59, 15p. incl. illus. tables (Rept. no. FGT-2183)
(Contracts AF 33(600)36200 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Alloys, *Aluminum alloys, Tensile properties, Tests, Shear stresses, Temperature, Materials, Mechanical properties, Metal plates.

The alloy maintained about 85% of its room temperature yield strength and 82% of its ultimate strength when tested at 260 F after a 100-hour exposure to 260 F. The percent elongation at room temperature was 10.3 for the longitudinal specimens, 8.2 for the long transverse, and 2.5 for the short transverse specimens. The ultimate shear strength to ultimate tensile strength ratio was about 0.6. The flatwise bearing test specimens exhibited a higher ultimate strength than the edgewise specimens. The difference was 12% for the e/D ratio of 1.5 and 14% for the e/D ratio of 2.0. The flatwise bearing test specimens with e/D ratio of 1.5 had 8% higher average bearing yield strength values than the corresponding edgewise specimens. The bearing yield strengths for an e/D ratio of 2.0 were approximately equal for edgewise and flatwise specimens. Typical failures of bearing specimens are given. There were some differences in the properties of the three test blocks. (Author)

AD-285 374 Div. 17
(TISTM/ODN) OTS price $3.60

General Dynamics/Fort Worth, Tex.
TESTS OF TITANIUM 8Al-1Mo-1V ALLOY HONEYCOMB SANDWICH PANEL AT 1000F AFTER EXPOSURE AT 1000F,
by A. C. Fehrle. 9 May 62, 28p. incl. illus. tables (Rept. no. ERR-FW-128)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Titanium alloys, *Honeycomb cores, *Sandwich construction, Tensile properties, Brazing, Mechanical properties, Manufacturing methods, Sprays, Sodium compounds, Chlorides, Alloys, Silver solders, Microphotography, Aluminum alloys, Aging, X-rays, Microstructure, Molybdenum alloys, Vanadium alloys, Solutions, Tests, Temperature, Stresses.

Preliminary tests of brazed Ti 8Al-1Mo-1V alloy sandwich structure at 1000 F are described. The panels tested were fabricated with 8-1-1 Ti faces and 6Al-4V Ti alloy honeycomb core brazed with Dynabraze B braze alloy. Cleaning procedures prior to brazing, brazing cycle, and aging cycle are reported. Copies of the x-rays of both brazed panels and photomicrographs of brazed joints before and after exposure at 1000 F are included in the discussion of results. Edgewise compression and tensile specimens were tested at room temperature, 1000 F, and room temperature after salt spray exposure to determine the strength of the faces and the ability of the core and braze alloy to support the faces. (Author)

AD-285 376 Div. 17
(TISTM/MS) OTS price $1.60

General Dynamics/Fort Worth, Tex.
TITANIUM (6 Al - 4V), HEAT TREATMENT OF,
by R. J. McClintick. Apr 58, 12p. incl. illus. tables (Rept. no. PCTR-4358)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Titanium alloys, *Mechanical properties, Tensile properties, Hardening, Tests, Heat treatment.

Phase I: The current heat treatment for 6 Al - 4V was modified to obtain the maximum strength without beta embrittlement. Tensile tests were conducted to determine the increase in strength obtained. Phase II: This part of the investigation was cancelled in lieu of a literature search for other titanium alloys with greater heat treatment response and hardenability.

AD-285 377 Div. 17
(TISTM/MS) OTS price $1.10

General Dynamics/Fort Worth, Tex.
PROCESS CONTROL-EVALUATION OF ALCOA'S NEW ARTI-

FICIAL AGING TREATMENT FOR 7079 ALUMINUM ALLOY,
by W. A. Token. 9 June 61, 6p. incl. tables
(Rept. no. PCTR-4597)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Aluminum alloys, Processing, Mechanical properties, Heat treatment, Aging

The two step aging treatment can be applied immediately after quenching from the solution heat treatment temperature, or after stretching or forming in the 7079-W temper and produce mechanical properties comparable to those obtained using the present aging treatment. This new procedure can be considered as an alternate to the practice described in MIL-H-6088B. Data on time delay between solution heat treatment and artificial aging of 7075 and 7178 is included. Immediate artificial aging of aluminum alloys, 7075 and 7178, does not produce marked differences of mechanical properties as compared with one, five, or ten day delay. (Author)

AD-285 382 Div. 17
(TISTM/MS) OTS price $5.60

Lycoming Div., AVCO Mfg. Corp., Stratford, Conn.
METASTABLE AUSTENITIC FORMING OF HIGH STRENGTH PRESSURE VESSELS.
Semiannual rept.no. 1,
by A. J. Alexander. 14 Sep 62, 18p. illus. tables, 21 refs.
(Contract AF 33(657)7955)
Unclassified report

DESCRIPTORS: *Pressure vessels, *Mechanical properties, *Stainless steel, Austenite, Failure (Mechanics), Tests, Deformation, Fracture (Mechanics), Steel.

Three alloys; Type H-11 hot work steel, AM 355 semi-austenitic stainless steel, and 18 NiCoMo (300) mar-aging steel were selected for shear spinning evaluation. The selected materials were purchased, extruded and shear spinning preform blanks machined. Subscale pressure cylinders with 0, 25, 50 and 75 percent reductions were produced and final machining of test specimens started. One pressure vessel was tested to failure. The available results of shear spinning and biaxial burst testing are presented. (Author)

AD-285 409 Div. 17, 26
(TISTM/EJH) OTS price $8.60

Republic Steel Corp., Canton, Ohio.
EVALUATION OF THE PRODUCIBILITY OF TWO NEW TITANIUM BASE SHEET ALLOYS, Ti-7Al-12Zr AND Ti-5Al-5Zr-5Sn.
Final rept., 1 Mar 60-16 Apr 62,
by M. Scott and T. Vretas. 16 Apr 62, 99p. incl. illus. tables.
(Contract NOa(s) 60-6035-c)
Unclassified report

DESCRIPTORS: *Titanium alloys, *Sheets, Aluminum alloys, Zirconium alloys, Heat resistant alloys, Production, Processing, Tin alloys, Rolling mills, Surface properties, Hardness, Heat treatment, Melting, Tensile properties, Deformation, Feasibility studies, Mechanical properties.

The commercial feasibility of producing titanium sheet product from two new alpha type alloys, Ti-7Al-12Zr and Ti-5Al-5Zr-5Sn was investigated. Laboratory size ingots, 200 pounds, were double vacuum melted and converted to sheet product for both analyses. Optimum finish hot rolling temperatures were determined as 1750 F for both alloy types. Processing and testing of the sheet product produced showed that the Ti-7Al-12Zr composition develops metallurgical instability as evidenced by bend properties and tensile ductility. This condition was not evident for the Ti-5Al-5Zr-5Sn alloy. (Author)

AD-285 459 Div. 17, 26
(TISTM/MS) OTS price $1.10

Massachusetts Inst. of Tech., Cambridge.
THE ROLE OF FINE STRUCTURE IN THE MECHANICAL BEHAVIOR OF METALS.
Quarterly rept. no. 11, 11 July-10 Sep 62,
by Morris Cohen and B. L. Averbach. 1 Oct 62, 3p.
(Contract AF 33(616)6873)
Unclassified report

DESCRIPTORS: *Nickel alloys, *Iron alloys, *Grains (Metallurgy), *Processing, Deformation, Martensite, Austenite, Heat treatment, Metals, Alloys, Tests, Tensile properties, Elasticity, Hyperfine structures, Microstructure, Mechanical properties.

Results are summarized on the effects of plastically deforming austenite on the strength of subsequently formed martensite in an iron-31.9 weight percent nickel - 0.017 weight percent carbon alloy. The deformation of the austenite did not change the Ms temperature, but the amount of martensite produced upon quenching to liquid nitrogen decreased with increasing reduction in thickness. The tensile properties of (a) deformed austenite, (b) martensite with prior deformation of the austenite, and (c) deformed martensite (originally obtained by refrigerating annealed austenite) were determined, and the corresponding 0.2 percent yield strengths of transverse and longitudinal specimens are shown. The ductility of the martensite as a function of deformation of the prior austenite exhibited a striking difference when compared with deformed martensite. The structures of deformed austenite and the resulting martensitic structures were studied by transmission electron microscopy. Attempts were made to measure the particle sizes and lattice strains in the ausformed martensite by x-ray line-breadth analysis. The strains in the ausformed martensite increased. The strengthening of the martensite by ausforming was relatively modest because of the low carbon content of the iron-nickel alloy under study. (Author)

AD-285 471 Div. 17
(TISTM/ODN) OTS price $1.25

Applications Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
ELEVATED TEMPERATURE CREEP PROPERTIES OF 17-7 PH AND A-286 STAINLESS STEEL.
Final rept. Feb 58-Mar 60 on Materials Applications,
by Marvin Knight. July 62, 40p. incl. illus. tables, 5 refs.
(Proj. 7381)
(ASD TDR 62-394) Unclassifed report

DESCRIPTORS: *Stainless steel, *Creep, Alloys, Tensile properties, Deformation, Rupture, Data, Heat treatment, Mechanical properties.

Creep property data for 17-7 PH and A-286 stainless steel alloys at elevated temperatures were obtained. Test specimens were cut from the sheet material parallel to the rolling direction. Test temperatures were: 17-7 PH at room temperature, 600, 800, and 900 F; and, A-286 at room temperature, 1200, 1350, and 1500 F. The data include ultimate tensile strength, tensile yield strength, elongation, creep deformation, and creep rupture properties at each temperature. (Author)

Division 17 - METALLURGY

AD-285 496 Div. 17
(TISTM/ODN) OTS price $.50

Naval Research Lab., Washington, D. C.
EXPLOSION TEAR TEST STUDIES OF HIGH-STRENGTH Q&T STEELS.
Final rept.,
by P. P. Puzak and A. J. Babecki. 6 Sep 62, 11p. incl. illus. tables, 10 refs. (NRL rept. no. 5836)
Unclassified report

DESCRIPTORS: *Steel, *Shear stresses, Fracture (Mechanics), Failure (Mechanics), Mechanical properties, Test methods, Alloys, Stainless steel, Tests.

Cleavage (brittle) fractures, have been investigated extensively. Proof-test failures involving 'low energy shear' fractures have been encountered under conditions of near-yield-point loading for structures (rocket cases) which utilized high-strength materials. This investigation was undertaken to develop a test method which would provide for the evaluation of tearing characteristics under explosive loadings for steels ranging in yield strength from 100 to 150 ksi. A new test, the explosion tear test, was developed. Preliminary results demonstrate that high-strength materials differ widely in tearing resistance. The relationship of Charpy V shelf level to tearing resistance has been examined. Shelf-level values significantly less than 40 to 50 ft-lb are shown to correlate with low energy shear characteristics in the explosion tear test. The quantitative correlation of Charpy V shelf level to tearing resistance of high-strength steels, however, is disclosed to be more complex than originally presumed. The complications, involving a yield-strength dependency and other factors, are discussed. (Author)

AD-285 499 Div. 17, 25
(TISTP/TL) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
EQUIVALENCE OF PENETRAMETER SYSTEMS,
by E. L. Criscuolo. 15 May 62, 18p. illus. 13 refs. (Rept. no. NOLTR 62-49)
Unclassified report

DESCRIPTORS: *Radiography, *X-ray photography, Non destructive testing, Mathematical analysis.

A mathematical expression was developed which relates the equivalency between different penetrameter types. Experimental data obtained from 36 film readers supports the validity of the equation. Equivalency between the International Institute of Welding and American Society for Testing and Materials penetrameters is given. (Author)

AD-285 532 Div. 17
(TISTM/MS) OTS price $1.60

Sylvania Electric Products, Inc., Towanda, Pa.
DEVELOPMENT AND PRODUCTION OF IMPROVED MOLYBDENUM SHEET BY POWDER METALLURGY TECHNIQUES.
Interim rept. no. 15, 1 Apr-31 May 62,
by Roger B. Bargainnier. 14 Sep 62, 7p. illus.
(Contract NOa(s) 60-6018-c)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, *Titanium alloys, *Powder metallurgy, *Sheets, Sintering, Carbon, Hydrogen, Nitrogen, Oxygen, Heat treatment, Hardening, Heat resistant alloys, Powder alloys, Powder metals, Hardness, Microstructure, Processing, Tensile properties.

The final experiments designed to optimize the processing of powder-metallurgical Mo-0.5Ti-C are described. They include variations in rolling schedule, powder, sintering temperature, resolution treatment, and adduct concentration. Some alloy variations are also included. (Author)

AD-285 567 Div. 17
(TISTM/TCG) OTS price $1.50

Martin-Marietta Corp., Baltimore, Md.
EFFECTS OF SURFACE ENVIRONMENTS ON THE MECHANICAL BEHAVIOR OF METALS.
Final rept.,
by I. R. Kramer. Aug 62, 50p. incl. illus. tables, 17 refs.
(Contract AF 33(616)7976, Proj. 7353)
(ASD TDR 62-99) Unclassified report

DESCRIPTORS: *Copper, *Single crystals, *Aluminum alloys, Polymers, Crystals, Surface properties, Solutions, Metallic soaps, Stresses, Plasticity, Deformation, Shear stresses, Tensile strength, Surface area, Stearic acids, Benzenes, Mechanical properties.

A study of the mechanical behavior of Cu single crystals in solutions containing surface-active agents shows that the weakening effect is associated with the formation and solution of metallic soaps. A large change in the stress-strain characteristics of polycrystalline Al alloys was found when the surface of the specimens was removed during plastic deformation. Studies of the effect of size of the specimen on the changes of slopes of Stages I and II by surface removal showed that the change of the slope of Stage I was independent of size with respect to the polishing rate; however, the change in the slope of Stage II with polishing rate increased directly in proportion to surface area or cross section. A surface removal treatment on single crystals eliminated the yield point, wherease the same type of treatment enhanced the yield point drop on Al alloys. Measurements of slipband spacing indicate that surface treatment affects the egress of dislocations. (Author)

AD-285 588 Div. 17, 4, 25
(TISTM/EJH) OTS price $1.75

Westinghouse Electric Corp., Pittsburgh, Pa.
OXIDATION OF TUNGSTEN AND TUNGSTEN BASED ALLOYS.
Final rept., Jan 61-Jan 62 on Metallic Materials,
by E. A. Gulbransen, K. F. Andrew and others.
July 62, 58p. incl. illus. tables, 21 refs.
(Contract AF 33(616)7888, Proj. 7351, Continuation of Contract AF 33(616)5770)
(WADC TR 59-575, pt. 3)
Unclassified report

DESCRIPTORS: *Tungsten alloys, *Tungsten, *Oxidation, Refractory materials, Thermodynamics, Thermochemistry, Vapor pressure, Oxygen, Reaction kinetics, Scale, Coatings, Oxides, Surfaces, Adsorption, High temperature research, Electron diffraction analysis, Laboratory equipment, Vacuum furnaces, Electron guns.

The rates of oxidation of W were determined from 1150 to 1615 C in oxygen pressures of 2 to 100 Torr. Very high rates of oxidation or surface recession rates were found above 1200 C. An exponential temperature behavior for the rate of oxidation was found for all of the pressure studied. A theoretical analysis of the data using the absolute reaction rate theory suggested that the rate of oxidation of tungsten was limit-

ed by a mobile absorption process of oxygen onto a tungsten surface already covered by a surface layer of oxide. Oxidation of a 50 w/o Ta-W alloy was studied over the temperature range of 1068 to 1458 C at 152 Torr oxygen pressure. A protective scale was formed on this alloy. The oxidation resistance was improved to a considerable extent over that of either of the pure metals or of other tungsten-tantalum alloys. A special 250 kv electron diffraction camera was developed for the study of the W-gas reacting interface. Preliminary diffraction data were obtained on the oxidation of W between 800 and 1000 C. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-284 850 Div. 18, 8
(TISTA/VGW) OTS price $10.50

General Electric Co., Syracuse, N. Y.
AIR WEAPONS CONTROL SYSTEM 412L.
Quarterly reliability program rept. no. 6.
30 June 62, 130p. incl. tables (Rept. no. AWCS-SQR-6)
(Contract AF 19(628)513)
Unclassified report

DESCRIPTORS: *Reliability, *Control systems, *Antiaircraft defense systems, Weapons, Life expectancy, Tables, Ground controlled interception systems, Data processing systems, Air force equipment, Electronic equipment, Mobile.

Reliability of an air weapon control system is reported with respect to the system reliability analysis, maintainability, subcontractors, and component reliability measurements. (Author)

AD-284 925 Div. 18, 22
(TISTW/PCR) OTS price $3.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
ON CHOOSING COMBINATIONS OF WEAPONS,
by Samuel Karlin, William E. Pruitt and William G. Madow. 27 Aug 62, 38p. incl. illus. 7 refs. (Technical rept. no. 33)
(Contract Nonr-22528, Proj. NR-047-019)
Unclassified report

DESCRIPTORS: *Weapons, *Games theory, Mathematical analysis, Equations, Naval logistics, Statistical processes, Operations research, Selection.

A model for evaluating the advantages of various weapons mixes for battle engagements is described. The choice of weapons mixes for various purposes is considered in the analysis. (Author)

AD-285 044 Div. 18, 20
(TISTP/WH) OTS price $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MOVEMENT OF MILITARY CENTERS AS SAFEGUARD AGAINST NUCLEAR ATTACK. PART II,
by Josef H. Halberstein. 12 June 62, 57p. incl. illus. tables (Rept. no. 22G-1)
(Contract AF 19(604)7400)
(AFESD TDR 62-130) Unclassified report

DESCRIPTORS: *Combat information centers, *Combat, *Nuclear warfare, *Survival, *Probability, *Effectiveness, Mobile.

A major military center (for instance, a tactical operations center, administrative operations center, fire direction center, etc.) is subject to nuclear or concentrated conventional attack if detected by the enemy. Frequently it is proposed to move centers from one location to another at short intervals as protection against such attacks. The operation of the center, however, is interrupted by moving it. A mathematical model of this situation previously developed (Lincoln Lab. Rept. 22G-0071, 5 May 61) is enlarged; different procedures of replacement for centers which have been destroyed are introduced, and their influence upon the operative loss is determined. It is shown that for many different replacement procedures it is possible to minimize the operative loss by judicious choice of the time of operation. (Author)

AD-285 417 Div. 18, 1
(TISTA/GEC) OTS price $2.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION OF C-130 ADVERSE WEATHER PARADROP CAPABILITY.
Final rept.,
by Lloyd B. Tidd, James W. Clabaugh, George E. Heckathorn. Aug 62, 24p. incl. illus. tables.
(Rept. no. TAC TR 61-52)
Unclassified report

DESCRIPTORS: *Transport planes, *Air drop operations, Effectiveness, Military requirements, All weather aviation, Radar navigation, Electronic equipment, Reliability, Navigation.

A study was conducted to determine the highest degree of low level enroute navigational effectiveness and resultant drop accuracy attainable under various weather conditions in the C-130 type aircraft utilizing airborne navigational aids presently installed in C-130 aircraft or currently available from within Air Force resources or from industry and operable without modification to the aircraft. This project was conducted in two basic phases; without ground navigational aids and with ground electronic aids available on the drop zone. It was determined that successful low level radar enroute navigation can be realized down to altitudes of 500 ft absolete altitude provided certain prerequisites are met. Utilizing Standard Calculated Air Release Point (CARP) procedures, circular errors for drops with no ground support were dependent on drop altitude and the availability of mandatory radar return references at periodic intervals along the flight course. (Author)

AD-285 436 Div. 18, 23
(TISTB/AW) OTS price $7.60

Ballistic Systems Div., Norton Air Force Base, Calif.
TRAINING EQUIPMENT PROCUREMENT FOR AIR FORCE BALLISTIC MISSILES AND MILITARY SPACE SYSTEMS.
1 Oct 62, 70p. incl. illus. (BSD Exhibit 59-17C)
Unclassified report

DESCRIPTORS: *Air force procurement, *Training devices, Guided missile personnel, Training films, Design, Military requirements, Standardization, Specifications.

Procedures, responsibilities, terms and conditions are given which govern: (1) Initial identification of all training equipment comprising the system training equipment package; (2) Design and development of trainers; (3) Selection and procurement of system equipment required for fabrication of trainers and use as bench items; (4) Installation and checkout of training equipment; (5) Identification, selection, and/or procurement of special support equipment required for installation and checkout of training equipment and maintenance of training equipment; (6) Identification and procurement of training films and transparencies; and (7) Identification and procurement of trainer operating and maintenance instructions. (Author)

AD-285 489 Div. 18, 1
(TISTA/GEC) OTS price $6.60

George Washington U., Washington, D. C.
MILITARY ESSENTIALITY OF NAVAL AVIATION REPAIR PARTS,
by Marvin Denicoff, Sheldon E. Haber, and Thomas C. Varley. 4 Oct 62, 57p. incl. tables, 8 refs. (Serial no. T-143)
(Contracts Nonr-76105, Proj. NR 047 001 and Nonr-76106, Proj. NR 347 008)
Unclassified report

DESCRIPTORS: *Naval supplies, *Naval logistics, Naval aircraft, Maintenance, Military requirements, Operations research, Patrol planes, Attack bombers, Jet fighters, Analysis, Naval operations, Feasibility studies.

A methodology for classifying aviation repair items by their military essentiality is described, and the results of field trials to test its feasibility and applicability are summarized. Military essentiality data for several aircraft were obtained by the use of a questionnaire. The answers to the questionnaire indicate a high degree of consistency among respondents and a wide dispersion in the military worth of repair items. (Author)

19. NAVIGATION

AD-285 218 Div. 19, 33
(TISTA/GEC) OTS price $9.10

Electronics and Ordnance Div., AVCO Corp., Cincinnati, Ohio.
THE DATA FLOW ANALYSIS OF A MOBILE ATC AID.
Final rept.,
by Allen C. Busch, Robert J. McNair, and Frederick J. Kirby. 31 Aug 62, 106p. incl. illus. tables (Rept. no. AE 207-62-7; RAD-TR-62-34)
(Contract AF 19(628)244)
(ESD TDR 62-190) Unclassified report

DESCRIPTORS: *Air traffic control systems, *Air traffic controllers, Analysis, Flight paths, Computers, Mathematical analysis, Display systems, Electronic equipment, Scheduling, Communication systems, Effectiveness, Operations research, Human engineering.

An analysis of internal data flow of Air Traffic Control Central AN/TSW-5 (modified to include a flight path prediction computer and a time schedule display unit) indicates that the modified semiautomatic shelter operations are improved in the following ways: improved controller ability to efficiently interleave arriving and departing aircraft; improved controller cognizance of the entire traffic situation; improved operational effectiveness under jamming; an acceptance rate in excess of 50 aircraft per hr by the AN/TSQ-47; additional tools and means to compensate for failure of radar or other navigational aids are provided; controllers become proficient at an earlier time in the training experience cycle; and the decision making task load on the entire AN/TSW-5 control team is reduced. With computer path-prediction and scheduling provided, the communication channel load factor is less than 70% at all controller positions when handling 50 approaches per hr. (Author)

AD-285 221 Div. 19
(TISTW/RD) OTS price $1.60

Antarctic Projects Officer, Washington, D. C.
TRAVERSE NAVIGATION IN POLAR REGIONS,
by George W. Fowler. July 62, 11p. incl. illus.
Unclassified report

DESCRIPTORS: *Arctic regions, *Celestial navigation, *Antarctic regions, Course mapping, Position finding, Navigation.

Traverse navigation in high latitudes is an art, subject to peculiarities of individual areas and to unique characteristics of polar regions in general. The navigator must think in terms of specialized navigation techniques and equipment, developed through research on the effects of astronomic, cartographic, and magnetic conditions. Season of operation, extremes of altitude and temperature, directive force of the earth's rotation, and surface irregularities all strike at the heart of normal navigational procedures in polar regions. Course plotting by rhumb lines necessitates constant compensation for the rapid convergence of meridians. A combination of dead reckoning and celestial navigation provides the basis for traverse navigation. For requirements that demand accurate positions in polar regions, a refined method has been developed: namely, the Fowler-Winn Method of Final Refinement of Position. (Author)

AD-285 276 Div. 19, 6, 33
(TISTA/GEC) OTS price $3.60

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
ACTIVITY REPORT.
Aug 62, 28p. incl. illus. (ESD-TDR-62-26)
Unclassified report

DESCRIPTORS: *Air traffic control systems, *Runway lights, *Glide path systems, *Radar navigation, Aviation safety, Airport radar systems, Data processing systems, Radio communications systems, Landing aids, Display systems, Doppler navigation Weather forecasting.

Contents:
Approach and landing systems
Airport lighting systems
Communications
Data acquisition, processing and display
Navigation
Research
Aircraft safety
Weather
Support activities

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-284 608 Div. 20
(TISTP/JW) OTS price $1.60

Rochester U., N. Y.
STUDY OF NUCLEAR INTERACTIONS PRODUCED BY 275 MEV DEUTERONS IN NUCLEAR EMULSIONS,
by M. V. K. Appa Rao and P. J. Lavakare.
31 Aug 61, 10p. illus. 16 refs. (Rept. no. NYO-10246)
(Sponsored by the Air Force Office of Scientific Research)
Unclassified report

DESCRIPTORS: *Nuclear reactions, *Cosmic ray bursts, *Deuteron reactions, Energy, Isotopes, Protons, Nuclear physics.

Nuclear interactions produced in nuclear emulsions by deuterons of mean energy 275 Mev were analyzed. The relevant parameters, needed for the study of the primary cosmic ray deuterons were obtained at this energy. (Author)

Division 20 - NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-284 673 Div. 20, 25
(TISTP/JW) OTS price $3.60

General Dynamics/Fort Worth, Tex.
HEAT DEPOSITION OF REACTOR NUCLEAR RADIATION IN AEROSPACE-VEHICLE MATERIALS,
by T. R. Strayhorn. 10 Sep 62, 32p. incl. illus. table, 6 refs. (Document no. NARF 62-12T; MR-N-289)
(Contract AF 33(657)7201)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Radiation effects, Temperature, Materials, Reaction time, Reactor kinetics, Gamma rays, Neutrons, Nuclear propulsion.

In order to determine the importance of radiation heating in nuclear-propelled aerospace-vehicle materials, a series of calculations was performed. The temperatures of the materials as a function of reactor power, distance from the reactor, and time were calculated. The results clearly indicate that the radiation heat input to materials in the vehicle must be determined and, where sufficiently great, be considered in the design calculations. (Author)

AD-284 759 Div. 20
(TISTP/WH) OTS price $1.60

Aerospace Information Div., Washington, D. C.
SOVIET BERYLLIUM PHYSICS REACTOR (BRF). REVIEW OF SOVIET LITERATURE.
31 Aug 62, 14p. incl. illus. tables (AID rept. no. 62-127)
Unclassified report

DESCRIPTORS: *Power reactors, *Reactor moderators, *Beryllium, *Reactor kinetics, *Neutron cross sections, USSR.

The results of this investigation led to the following conclusions: Metallic beryllium has a very small neutron absorption cross-section (6.0 ± 1.2 to the -27th power sq cm). The mass production of high purity beryllium (having total impurities of less than 1 mbarn per beryllium nucleus) presents serious technological difficulties. However, beryllium with total impurities of 2 to 3 mbarn per nucleus can be produced in large quantities. This beryllium has an absorption cross-section of 9.0 ± 1.2 to the -27th power sq cm and can be used in thermal reactors. The problem of the practical use of beryllium in the construction of an actual reactor can only be solved after completion of the study of the physicomechanical and corrosive properties of beryllium under conditions similar to actual reactor operating conditions. (Author)

AD-284 806 Div. 20
(TISTP/WH) OTS price $1.10

Stevens Inst. of Tech., Hoboken, N. J.
A RADIATIVE TAU POSITIVE DECAY.
Technical rept.,
by E. L. Koller, S. Taylor and others.
17 Sep 62, 6p. incl. illus. tables (Rept. no. SIT-P72 (9/62))
(Contract Nonr-306600)
Unclassified report

DESCRIPTORS: *Mesons, *Pions, *Radioactive decay, *Photographic emulsions, Bevatrons.

An unusual K(+) decay event, believed to be K(+) yields pi(+) + pi(+) + pi (-) + gamma, has been found during an examination of K(+) endings for Dalitz pairs. About 30,000 K(+) endings have been scanned to date in G5 nuclear emulsion exposed to a K(+) beam at the Bevatron of the Lawrence Radiation Laboratory of the University of California. The event appears qualitatively as a 'non-momentum conserving' tau(+) decay at rest. (Author)

AD-284 996 Div. 20
(TISTM/EJH) OTS price $2.60

United Nuclear Corp., White Plains, N. Y.
REVISED CROSS SECTIONS FOR NEUTRON INTERACTIONS WITH OXYGEN AND DEUTERIUM.
Topical rept.,
by M. H. Kalos, H. Goldstein, and J. Ray.
31 Aug 62, 19p. incl. tables, 14 refs. (Rept. no. UNC-5038)
(Contract DA 18-108-cml-7156)
Unclassified report

DESCRIPTORS: *Neutron cross sections, *Oxygen, *Deuterium, *Neutron scattering, Neutrons, Scattering, Tables, Theory, Kinetic theory.

A revision of the data for angular distributions for elastic neutron scattering in oxygen and deuterium is presented. The kinetics of the (n,2n) reaction in deuterium is discussed and a Monte Carlo scheme for generating the energy and direction of secondary neutrons is given. Complete sets of the cross sections for both materials are tabulated. (Author)

AD-285 060 Div. 20
(TISTP/JW) OTS price $14.00

Naval Radiological Defense Lab., San Francisco, Calif.
RADIOLOGICAL RECOVERY OF LAND TARGET COMPONENTS-COMPLEX I AND COMPLEX II,
by W. L. Owen and J. D. Sartor. 25 May 62, 218p. incl. illus. tables, 13 refs. (Rept. no. NRDL-TR-570)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Radiation effects, *Radiological contamination, Feasibility studies, Preparation, Military operations, Wind, Precipitation, Nuclear warfare, Recovery.

Facilities escaping physical damage from a nuclear attack still may have to cope with hazardous amounts of fallout material. The survival of personnel and the resumption of vital missions could depend upon the timely removal of the fallout deposits. The safe performance of such a removal effort is possible only if a detailed radiological recovery plan exists before attack. Two closely similar experiments were conducted on the operational recovery of an artificially contaminated land target complex. In each case a suitable recovery plan was formulated and executed. The results showed that, within prescribed dose limits, pre-attack planning of a radiological recovery operation is not only feasible but strongly recommended. (Author)

AD-285 268 Div. 20
(TISTP/WH) OTS price $1.60

Naval Research Lab., Washington, D. C.
SURVEILLANCE OF CRITICAL REACTOR COMPONENTS TO ASSESS RADIATION DAMAGE.
Interim rept.,
by L. E. Steele and J. R. Hawthorne. 7 Sep 62, 12p. incl. illus. tables, 4 refs. (NRL rept. no. 5830)
Unclassified report

DESCRIPTORS: *Steel, *Radiation damage, *Power reactors, *Neutron bombardment, Metallurgy.

The assessment of radiation damage to power reactor structural components currently can only be made by extrapolation of data from test reactor experiments. In order to verify such extrapolations, representative metallurgical specimens were recently placed in operating nuclear power reactors for long-term irradiation at points typical of the operating nuclear environment. These irradiation efforts, termed ''surveillance,'' were undertaken in most of the United States nuclear power reactors. The extent of current and planned surveillance programs along with a more specific review of the program for the Army SM1A Reactor is described. The features of typical and idealized surveillance programs as well as the anticipated technological benefits of these efforts are also reviewed with emphasis upon nuclear environmental factors. (Author)

AD-285 294 Div. 20
(TISTP/WH) OTS price $2.60

University Coll., London, (Gt. Brit.)
ANGULAR CORRELATIONS IN LAMBDA BETA DECAY,
by L. Egardt. 4 July 62. 19p. incl. illus. table, 5 refs. (Technical note no. 7)
(Grant no. AF EOAR 62-3)
Unclassified report

DESCRIPTORS: *Hyperons, Nucleons, *Nuclear reactions, *Beta decay.

A current-current type of interaction is assumed with the conventional lepton current coupled to a general hyperon current involving 6 unknown form factors. The expression obtained for the electron proton angular correlation is to a large extent dominated by phase space and for reasonable assumptions about the form factors the angular distribution of electrons with respect to the proton momentum is always peaked in the backward direction. This also holds true for a scalar, pseudoscalar or a tensor interaction. Some comments are made on the effect of an intermediate particle. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-284 509 Div. 22
(TISTW/JRG) OTS price $1.10

General Technology Corp., Elgin, Ill.
RESEARCH AND DEVELOPMENT STUDY OF STRESS-STRAIN CHARACTERISTICS OF SHELLS AND HIGH EXPLOSIVES.
Quarterly progress rept. no. 11, 1 Mar-31 May 62.
31 May 62, 9p. incl. illus.
(Contract DA 11-022-ORD-2917, Proj. TA2-8051)
Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Projectiles, *High-explosive ammunition, *Explosives, Measurement, Temperature, Deformation, Pressure, Rotating bands, Projectile cases, Cartridge cases, Mechanical properties, Digital computers, Stresses.

Work is continuing on the determination of the stress-strain characteristics of shells and high explosives. Two rounds were instrumented and fired in the filler support study to obtain data on shell deformation. Filler support can be detected in two ways: (1) through an increase in rotating band pressure in the filled shell and (2) through a decrease in wall deflection in the filled shell. A graph is presented, showing shell strain (circumferential) vs shell wall thickness for filled and unfilled shells. The shells used were 155mm M101's (modified). Three wall thicknesses, 4/16, 5/16, and 6/16 in., were tested, the filler being inert simulant E. Rotating band pressure vs shell wall thichness is given. Substantial support was provided by the filler. (Author)

AD-284 515 Div. 22
(TISTW/PCR) OTS price $1.10

Little, Arthur D., Inc., Cambridge, Mass.
SENSITIVITY OF CASED EXPLOSIVE MATERIALS TO IMPACT BY REGULAR FRAGMENTS.
Progress rept. no. 4, 28 May-29 June 62.
29 June 62, 5p. illus. table.
(Contract DA 19-020-ORD-5617)
Unclassified report

DESCRIPTORS: *Explosives, *Propellants, Impact shock, Fragmentation, Velocity, Projectile cases, Rocket cases, Thickness, Calibration, Test methods, Photographs, Sensitivity.

This experimental program deals with the sensitivity of certain cased explosives and propellants to impact by regular fragments. It is designed to aid in determining a more realistic quantity-distance relationship for the storage of ordnance explosive material. The intent of this project is to establish a limiting fragment mass vs impact velocity relationship for the detonation of certain explosives and/or propellants enclosed in casings of different thicknesses. The initial calibration tests, the first test firings into receiver charges, and a preliminary evaluation of results are discussed. (Author)

AD-284 559 Div. 22
(TISTW/JRG) OTS price $1.10

General Technology Corp., Elgin, Ill.
RESEARCH AND DEVELOPMENT STUDY OF STRESS-STRAIN CHARACTERISTICS OF SHELLS AND HIGH EXPLOSIVES.
Quarterly progress rept. no. 12,
1 June-31 Aug 62.
31 Aug 62, 6p. incl. illus.
(Contract DA 11-022-501-ORD-2917)
Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Projectiles, *High-explosive ammunition, *Explosives, Detonation, Measurement, Rotating bands, Projectile cases, Cartridge cases, Mechanical properties, Digital computers, Stresses.

Research and development are being conducted on the stress-strain characteristics of shells and high explosives. Two rounds were used in connection with the yielding study. In one round,

a single circumferential gage was mounted under the midpoint of the rotating band. Gun gages were mounted at half-inch intervals over the region of the forcing cone. In the other round, five circumferential gages and one axial gage were mounted inside the shell in the region of the rotating band. In this second round a new technique was tried for mounting gages within the shell. While this technique will probably prove superior to previous methods, it was not successful on this first attempt. Preparations were contineed for the base support study. The four rounds to be used were full instrumented and are ready for firing. M101 155mm shells, modified to the flat base form, are being used in this investigation. Work was continued on the digital computer program for determining displacement, stress, and strain in a flat base shell. Progress was made for the case where buckling of the base is not neglected. (Author)

AD-284 754 Div. 22
(TISTW/RD) OTS price $16.50

Research Triangle Inst., Durham, N. C.
MAINTENANCE SUPPORT FORMULAS.
Final rept.
30 Nov 61, 260p. incl. illus. tables.
(Contract DA 01-009-ORD-912)
Unclassified report

DESCRIPTORS: *Ordnance, *Maintenance, Costs, Failure (Mechanics), Reliability, Armies.

Research is reported on the development of a quantitative decision model that can be used in the selection of the most appropriate method of support for each item of ordnance equipment that will be applicable to existing and newly developed material, and that is capable of shedding light on the criteria that will be considered in developing new equipment designs. The study objective has been accomplished by providing the following: (1) formulas which constitute a cost estimation model by which overall costs (including logistical costs) of alternate methods of support may be compared and the low cost method selected; (2) methods to assist in the estimation of constraints and input variables for the model; (3) assistance in selecting the item for study and the alternatives to be considered, including a major component formula; and (4) examples of model application to end items supported by Frankford Arsenal. (Author)

AD-284 795 Div. 22
(TISTW/JRG) OTS price $3.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
ON THE SCALING OF ROCKETS,
by Serge J. Zaroodny. Aug 62, 32p. incl. illus. 7 refs. (BRL memo. rept. no. 1421)
(DA Proj. 503-03-009)
Unclassified report

DESCRIPTORS: *Rockets, Mathematical analysis, Statistical analysis, Sensitivity, Wind, Design, Launching, Terminal ballistics, Test methods, Model tests, Rocket trajectories, Ballistics, Theory.

The theory of scaling of rockets from one caliber to another is reviewed. The estimate of accuracy is divided into an estimate of sensitivities and an estimate of causes of dispersion. It is shown that, with some attention paid to the units used, the sensitivities may be unchanged by a change in caliber; however, the relative precision should be expected to be poorer with smaller rockets. A rule of thumb is proposed: absolute precision varies as the 0.6 power of caliber. (Author)

AD-284 856 Div. 22
(TISTW/DLW) OTS price $19.75

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
PERFORMANCE THEORY OF THE GUNFIRE CONTROL SYSTEM X-1,
by Frederic D. Grant and David G. Hoag.
July 60, 309p. incl. illus. (Rept. no. R-117)
(Contract NOrd-10796)
(NAVORD rept. no. 5344) Unclassified report

DESCRIPTORS: *Antiaircraft fire control systems, *Radar tracking, *Optical tracking, Parallax computers, Radar equipment, Shipborne, Fire control, Range finding, Fire control computers, Operation, Aerial targets.

Contents:
Over-all theory of the gunfire control system X-1
Basic antiaircraft mode; Optical mode; Surface fire and bombardment modes;
Secondary gun control
Major components of the system
Designation, search, and acquisition; Radar LS-TL comparator and tracking correction signal resolver; Tracking signal modifier; Drive systems; Lead computing system; Geometrical combinor; Range function generators; Future range computer; Nonstandard time-of-flight function generator; Curvature correction system; Parallax corrector; Gun order coordinate converter; Fuze time computer; Components used in various modes

AD-285 030 Div. 22
(TISTW/RD) OTS price $7.60

Diamond Ordnance Fuze Labs., Washington, D. C.
PROGRAMMER SYSTEM FOR INTEGRATED COPPERHEAD LIGHTWEIGHT FUZE SYSTEM,
by Kenneth R. Scudder and Joseph M. Iseman.
15 Aug 62, 75p. incl. illus. tables, 17 refs.
(Rept. no. TR-1053)
(Proj. 61100) Unclassified report

DESCRIPTORS: *Rocket fuzes, *Time delay fuzes, Flight testing, Safety, Rocket heads, Reliability, Accelerometers, Fuzes, Safety devices, Arming devices, Subminiature electronic equipment, Miniature fuzes, Programming.

A series of programmer systems, weighing 1 ob, have been designed and fabricated to demonstrate the feasibility of a lightweight, integrated electronic missile fuze system called Copperhead. The feasibility of the system has been demonstrated by the satisfactory performance of 4 of 7 fuzes that have been flight tested aboard test missiles (of the Little John type) in environments of specified characteristics. The three basic building blocks of the Copperhead programmer system are: (1) a safety mechanism; (2) an electronic timer (programmer); and (3) a ground-control unit. A detailed description of the flight tested Copperhead programmer system as well as descriptions of historical and alternate systems are presented. The flight-tested system employs some of the newest transistor micromodules. Alternate systems use mechanical and magnetic-core components. The operational and environmental tests and flight tests are discussed and their results evaluated. (Author)

AD-285 042 Div. 22
(TISTW/RD) OTS price $2.60

Illinois U., Urbana.
ANALYSIS OF MISSILE LAUNCHERS. PART R. APPROXIMATE FORMULAS FOR PITCH VELOCITY AT TIP-OFF.

Report on Dynamics of Missile Launchers,
by M. Stippes. Aug 62, 19p. incl. illus. (T&AM rept. no. 222)
(Contract DA 11-070-508-ORD-593, Proj. 517-01-002)

Unclassified report

DESCRIPTORS: *Rocket launchers, Pitch, Velocity, Exterior ballistics, Equations, Motion, Thrust, Design, Differential equations, Numerical analysis, Dynamics.

The preliminary design or feasibility study of a straight rail launching system requires, in addition to layouts and material composition, estimates of the accuracy of the system. Possible sources of inaccuracy, which is defined to be nonreproducable tip-off velocity, are thrust misalignment, rail curvature arising from manufacturing processes or uneven heating due to the sun, shaking forces of unknown phase which might exist in SOSR designs, or excessive amounts of friction between shoes and rail. Techniques are presented of analysis for a straight rail system with a view toward obtaining estimates of changes in pitch velocity of the rocket at tip-off as might exist because of the presence of these various disturbing agencies. (Author)

AD-285 047 Div. 22
(TISTW/RD) OTS price $2.60

Miller Research Labs., Baltimore, Md.
PRODUCTION COMPONENTS FOR CARTRIDGE, 81 MM, ILLUMINATING, T214E2.
Monthly progress rept., 1-31 Aug 62,
by E. R. Briggeman. 10 Sep 62, 22p. incl. illus. table (Rept. no. PR-251-8-62)
(Contract DA 36-034-ORD-3468)

Unclassified report

DESCRIPTORS: *Illuminating projectiles, Cartridges, Tests, Plastics.

Manufacture of the tail cone was initiated, and delivery of the raw impact extrusions is expected during September. The initial tail cone had a wall thickness of 0.24 in., and since it demonstrated more than adequate strength, an investigation was begun to determine if the weight could be reduced further. Tests on a group of 10 tail cones with a 0.21 in.-wall indicate adequate strength. (Author)

AD-285 063 Div. 22, 14
(TISTM/EJH) OTS price $3.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
EFFECTS OF MOLDED REINFORCED PHENOLIC MATERIALS AND STRUCTURE ON IMPACT CHARACTERISTICS OF XM8 CLOSING PLUG FOR 120 MM T42 PROPELLING CHARGE,
by Donald Miller. Oct 62, 41p. incl. illus. tables, 13 refs. (Technical rept. no. 3004)
(DA Proj. 593-32-008)

Unclassified report

DESCRIPTORS: *Cartridge case plugs, *Fin stabilized ammunition, *Propelling charges, Phenolic resins, Reinforcing materials, Cotton textiles, Shock resistance, Impact shock, Mechanical properties.

The object of this study was to develop a closing plug which would: close off a propellant cartridge case, and allow no leakage of propellant; be structurally resistant to impact loading and act as a centering device for the semifixed projectile; break up completely on firing; and utilize the best non-critical structural plastic materials compatible with maximum economy. A functional and structural study was conducted, and a number of design and material variations were developed. Plugs molded from phenolics reinforced with various materials-woodflour, cotton flock-rubber, chopped cotton fabric, and chopped glass fiber-were investigated. A closing plug made of a chopped cotton fabric reinforced phenolic material, was considered to most nearly meet the design and development objectives. (Author)

AD-285 089 Div. 22
(TISTP/JW) OTS price $1.60

Diamond Ordnance Fuze Lab., Washington, D. C.
MAGNETIC CORE LOGIC FOR A PROGRAMMER SYSTEM,
by G. W. Kinzelman and H. J. Rosenberg.
6 Sep 62, 19p. incl. illus. 5 refs. (DOFL rept. no. TR-1055)
(Proj. DA-5N12-15-031)

Unclassified report

DESCRIPTORS: *Fuzes, *Magnetic cores, Artillery, Proximity fuzes, Switching circuits, Circuits, Programming, Timing circuits.

The magnetic core logic used in the timing and decision circuits of a programmer system for an artillery shell fuze is explained. The programmer system generates arming signals and may act either as a time fuze or as a time controlled monitor for a proximity fuze. In comparison with previously designed programmer systems, the present design has the two-fold advantage of eliminating the manual fuze-setting switch and allowing monitoring of the proximity fuze. These additional features are achieved with a small increase in the magnetic core circuitry. (Author)

AD-285 162 Div. 22
(TISTW/RD) OTS price $4.60

Illinois U., Urbana.
ANALYSIS OF MISSILE LAUNCHERS. PART J2. ANALYSIS OF A MULTIPLE ROCKET LAUNCHER.
Report on Dynamics of Missile Launchers,
by D. Cullen. July 62, 42p. incl. illus. (T&AM rept. no. 221)
(Contract DA 11-070-508-ORD-593, Proj. 517-01-002)

Unclassified report

DESCRIPTORS: *Rocket launchers, Equations, Motion, Mobile, Moments, Exterior ballistics, Integrals, Design, Numerical analysis, Dynamics.

An investigation is presented of the dynamic response of a mobile, multiple rocket launcher to the forces generated during the launching of its rocket load. A simple two degree of freedom model is used to represent the launcher, and the equations of motion are uncoupled and linearized by assuming that the angular deviations about the equilibrium position are small. Motion of the rocket through the launcher was neglected and the blast forces generated by the rocket exhaust gasses, as calculated from one dimensional rocket theory, are approximated to facilitate computation. Some numerical results are presented in graphical form. (Author)

AD-285 273 Div. 22, 30
(TISTW/JRG) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
THE DESIGN AND TESTING OF THE NAVAL ORDNANCE LABORATORY'S 2-IN. TWO-STAGE GUN,
by H. L. Carter, D. A. Oakes and others. Sep 62, 10p. illus. 1 ref. (Ballistics research rept. no. 71; NOLTR 62-112)

Unclassified report

DESCRIPTORS: *Hypervelocity guns, *Hypervelocity projectiles, Test facilities, Interior ballistics, Aerodynamic data, Re-entry vehicles, Design, Tests.

A 2-in. two-stage gun was successful in launching complex models in the Naval Ordnance Laboratory's 1,000-ft. hyperballistics range no. 4 at velocities in excess of 15,000 ft/sec. The design of the 2-in. gun and the results of the first 44 shots are reviewed. (Author)

AD-285 398 Div. 22, 2
(TISTW/RD) OTS price $7.60

Naval Ordnance Lab., White Oak, Md.
REPORT ON PHASE II OF THE FEASIBILITY COMMITTEE FOR 200,000-FOOT ALTITUDE INSTRUMENTED HASP,
by M. J. Parker, S. J. Raff and others. Aug 62, 74p. incl. illus. tables (Rept. no. NOLTR 61-15)
Unclassified report

DESCRIPTORS: *Sounding rockets, Rocket heads, High altitude, Upper atmosphere, Radar confusion reflectors, Meteorological radar, Meteorological balloons, Gun launched, Telemetering, Instrumentation.

Research concerns the production of an engineering design of a meteorological rocket head. The meteorological rocket is intended to be part of the High Altitude Sounding Projectile (HASP) family. The final results of the investigation were the successful firing of three instrumented HASP rounds in 1 3/8-in. diam. HASP heads using the 100,000-ft. rocket motor. This instrumented HASP used the so-called telemetering-only instrumentation. The temperature was measured by a bead thermistor and was telemetered to the ground instrumentation. Also included were: (a) the initiation of a contract to develop a miniature baroswitch for sensing pressure; (b) successful HASP wind--tunnel tests using pressures equivalent to 100,000-ft. altitude; (c) an extensive analysis of ROBIN, a Rocket Balloon Instrument; and (d) a complete analysis leading to designs for the descent device for the HASP instrument package. (Author)

23. PERSONNEL AND TRAINING

AD-284 679 Div. 23
(TISTB/AW) OTS price $3.60

New York U. Coll. of Engineering, N. Y.
EFFECTS OF INDUCED STRESS IN A NAVAL TRAINING SCHOOL,
by Sol Klier and Wallace Schneider. July 62, 38p. incl. tables, 10 refs.
(Contract N61339-565)
(NAVTRADEVCEN 565-3) Unclassified report

DESCRIPTORS: *Stress (Psychology), *Military training, Adjustment (Psychology), Anxiety, Fear, Learning, Military personnel, Test methods, Effectiveness, Combat.

Stressful conditions were introduced during a three-week period in a U. S. Naval Parachute Rigger School. The trainees subjected to these conditions (experimental group) were compared with similar trainees who were not subjected to these conditions (control group) in terms of (1) grades on the practice, performance, and written tests regularly administered at the school during the three-week period, and (2) performance in a later stressful situation (a written test administered in an aircraft just prior to a free-fall parachute jump). For the analysis, the experimental and control groups were each divided into high and low ability groups in terms of the school entrance test requirements. Results were that (1) the experimental groups obtained generally significantly higher test grades than the control groups during the three-week period, (2) there was no difference between the experimental and control groups in performance in the later stressful situation, and (3) the imposed stressful conditions did not have different effects on the high and low ability groups. (Author)

AD-284 802 Div. 23
(TISTB/AW) OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
PREDICTION OF UNFAVORABLE DISCHARGE BY SEPARATE EDUCATIONAL LEVELS,
by Mary Agnes Gordon and Robert A. Bottenberg. Apr 62, 10p. incl. tables, 4 refs. (Rept. no. PRL TDR 62-5)
(Proj. 7719)
Unclassified report

DESCRIPTORS: *Aviation personnel, *Recruiting, Aptitude tests, Education, Selection, Determination, Identification, Statistical analysis.

The hypothesis that different combinations of tests might be needed for men with little schooling than for those at a higher level of education is tested. Multiple regression analyses of the data for two large samples of airmen showed little gain in accuracy of prediction by separate composites for three educational levels. Of the individual predictors of Air Force success, amount of education proved the most valid, further justifying the Air Force in limiting recruitment to high school graduates. (Author)

AD-284 821 Div. 23
(TISTB/AW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
THE USE OF SELF-INSTRUCTIONAL DEVICES IN COUNSELING,
by John F. Cogswell and A. Garth Sorenson. 22 Aug 62, 8p. (Rept. no. SP 940)
Unclassified report

DESCRIPTORS: *Education, *Teaching machines, Achievement tests, Aptitude tests, Intelligence tests, Vocational tests, Students, Social communication, Effectiveness, Standardization, Automation.

Advantages of the use of self-instructional devices in counseling are discussed. The use of self-instructional devices and programs to help in the interpreting of tests to students is suggested and illustrated. The technique of constructed self-instructional materials as a means for developing more effective communication and as a means for studying the problems of the communications process is discussed. (Author)

AD-285 092 Div. 23
(TISTB/AW) OTS price $14.00

Lockheed Aircraft Corp., Marietta, Ga.
QUALITATIVE AND QUANTITATIVE PERSONNEL REQUIREMENTS INFORMATION FOR DEPOT LEVEL SUPPORT C-141A TURBOFAN TRANSPORT (AIR FORCE REVIEW DRAFT)
PART 2,
Sep 62, 203p. incl. illus.
Unclassified report

DESCRIPTORS: *Aviation personnel, *Maintenance personnel, *Transport planes, Supply depots, Navigation computers, Military training, Clas-

sification, Job analysis, Data, Flight, Turbofan engines, Military requirements.

An early estimate of personnel required to supply depot level support for the AN/ASNLS 61-3 (C-51) Flight Data Recorder and the AN/ASN-24 Navigation Computer systems used in the C-141 turbofan transport is provided, which can serve as a basis for further development of manpower, personnel, and training plans and programs. This document is intended as a basic guide and reference for all Air Force over-haul agencies concerned with: the identification of Air Force Wage Board classifications, the development of depot manning tables and documents, and the development of training concepts and plans. (Author)

AD-285 185 Div. 23
(TISTB/AW) OTS price $2.60

American Inst. for Research, Washington, D. C.
CALIBRATION OF AIR FORCE SELECTION TESTS TO PROJECT TALENT NORMS,
by John T. Dailey, Marion F. Shaycoft and David B. Orr. May 62, 20p. incl. tables, 2 refs.
(Contract AF 41(657)324, Proj. 7717)
(PRL TDR 62-6) Unclassified report

DESCRIPTORS: *Aptitude tests, Aviation personnel, Recruiting, Identification, Selection, Standardization.

To tie in norms for Air Force personnel tests with the full range of talent in the recruitment population, the Project Talent test battery was given to a sample of basic airmen. The sample was split into halves, each numbering over 1200 airmen. By multiple regression techniques, applied separately to each half sample, composites of Talent tests were selected to predict scores on each of 27 Air Force tests. Close agreement between the two samples on tests selected and regression weights derived gives confidence in the results. Tables were prepared of equivalent scores between each Air Force test and the best composite of Talent tests. (Author)

AD-285 186 Div. 23
(TISTB/AW) OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
OSCAR: OPTIMUM SELECTION, CLASSIFICATION, AND ASSIGNMENT OF RECRUITS,
by Fred E. Holdredge. July 62, 11p. incl. illus. tables, 11 refs. (Rept. no. PRL TDR 62-13)
(Proj. 7719) Unclassified report

Presented at the World-Wide Conference on Personnel Data Control System, Orlando Air Force Base, Florida, 15-17 Feb 1962.

DESCRIPTORS: *Management engineering, *Personnel, *Military personnel, Recruiting, Classification, Selection, Statistical analysis, Data processing systems, Automation, Control, Military procurement, Identification.

Three mathematical models, adaptable for electronic processing machines, are described in nontechnical terms and illustrated by applications to personnel procurement and assignment problems. Emphasis is on capability for providing management with meaningful information for controlling a complex personnel system. (Author)

AD-285 295 Div. 23, 32
(TISTB/AW) OTS price $3.60

Occupational Research Center, Purdue U., Lafayette, Ind.
A STUDY OF THE ACTIVITY CONNOTATIONS OF JOB-RELATED VERBS,
by George G. Gordon and Ernest J. McCormick. Sep 62, 26p. incl. tables, 13 refs. (Rept. no. 1)
(Contract Nonr-110019) Unclassified report

DESCRIPTORS: *Job analysis, Vocabulary, Psychometrics, Effectiveness.

Semantic problems in job description were explored. An attempt was made to classify verbs used in job descriptions along a continuum of orientation, where the end points were defined as: (1) Job-Oriented--those words which characterize what is accomplished in a work activity in terms of job objectives, but do not specifically characterize what the worker is doing. (2) Worker-Oriented--those words which characterize what the worker is doing, that is, the human behaviors that are involved in the job. A sample of approximately 1000 verbs was extracted from over 4000 job definitions of the U. S. Employment Service. These words were subjected to two sorting procedures to identify those which had some degree of worker orientation associated with them. A total of 300 words were identified in this manner and these were judged along a 7-point scale of orientation. This scale was constructed in such a manner that subjects could indicate the inapplicability of a work to this type of classification. The distinction between 'job orientation' and 'worker orientation', as applied to verbs relating to human work activities, was one which was differentiated, to a statistically significant degree, by both naive and sophisticated raters. The pooled judgments of several raters resulted in categorizations which had very substantial reliability. (Author)

AD-285 437 Div. 23, 28
(TISTB/CCH) OTS price $1.60

Ballistic Systems Div., Norton Air Force Base, Calif.
RESEARCH PROPOSALS FOR PERSONNEL SUBSYSTEMS STATE-OF-THE-ART ADVANCEMENT IN BALLISTIC AND SPACE SYSTEM DEVELOPMENT,
by Melvin S. Majesty. 22 Mar 62, 13p.
Unclassified report

DESCRIPTORS: *Human engineering, *Aviation personnel, *Space flight, *Psychology, *Literature, Training, Training devices, Stress (Physiology), Fatigue, Job analysis, Operation, Reaction (Psychology), Survival, Costs, Military requirements, Effectiveness.

AD-285 438 Div. 23
(TISTB/AW) OTS price $1.60

Ballistic Systems Div., Norton Air Force Base, Calif.
HUMAN FACTOR CONCEPTS FOR TESTING COMPLEX MAN/MACHINE SYSTEMS,
by Melvin S. Majesty. 16 June 61, 13p. incl. illus. 5 refs.
Unclassified report

DESCRIPTORS: *Aviation personnel, *Guided missile personnel, *Human engineering, Job analysis, Vocational tests, Military training, Effectiveness, Reliability, Selection, Military requirements, Spaceships.

The purpose of PSS (Personnel subsystem) development is to provide the performance required of personnel in the system. The PSS developer must satisfy the system requirements for human performance and insure that the system is compatible with man's capabilities and limitations. The objective is to assure the availability of qualified military personnel concurrent with the

availability of system hardware to the user. PSS processes and products support human performance for the system and must be evaluated in terms of their contribution to reliable and efficient human performance. Some of the areas of consideration are: the inter-relationship of functions performed by system people and system hardware, human engineering, personnel requirements, training and training equipment, life support, and test and evaluation. (Author)

AD-285 443 Div. 23
(TISTB/AW) OTS price $1.60

Air Force Ballistic Missile Div., Air Research and Development Command, Inglewood, Calif.
PERSONNEL SUBSYSTEM TESTING FOR BALLISTIC MISSILE SPACE SYSTEMS.
22 Apr 60, 9p. (AFBMD Exhibit 60-1)
Unclassified report

DESCRIPTORS: *Guided missile personnel, Job analysis, Vocational tests, Human engineering, Effectiveness, Military requirements, Reliability.

The nature of the personnel subsystem test effort is defined which, as an integral part of weapon system development, serves to determine the effects of human performance on system performance, the capability of military personnel to provide the performance required by the system, and the adequacy of the processes and products essential to the development and support of the personnel subsystem. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-285 127 Div. 24
(TISTA/VGW) OTS price $2.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
FIELD SHIFT IN HIGH-SPEED ROTATING MIRROR FRAMING CAMERAS,
by D. C. Wunsch and A. H. Guenther. Sep 62, 23p. incl. illus. table (Rept. no. AFSWC TDR 61-76)
(Proj. 5776)
Unclassified report

DESCRIPTORS: *High speed cameras, *Rotating mirror cameras, *High speed photography, Data processing systems, Mathematical analysis, Corrections.

High-speed framing cameras, which make use of rotating mirrors acting as field stops, exhibit a changing field of view and frame size as the mirror rotates. The use of the frame edge as a reference line in data analysis from the film requires that the magnitude of these effects be known. A discussion of these effects and calculations of their magnitude for a Beckman and Whitley model 189 framing camera are given. (Author)

25. PHYSICS

AD-284 537 Div. 25, 4
(TISTP/JW) OTS price $3.60

Cornell U., Ithaca, N. Y.
CHEMICAL KINETICS: A GENERAL INTRODUCTION,
by S. H. Bauer. 1961, 38p. incl. illus. table, 44 refs.
(Contract AF 49(638)716)
Unclassified report

Presented at ARS International Hypersonics Conference, August 16-18, 1961, Cambridge, Massachusetts.

DESCRIPTORS: *Chemical properties, *Kinetic theory, Gases, Dynamics, Molecular association, Fluid flow, Temperature, Pressure, Hypersonics, Density.

The relationships between the experimentally determined quantities and molecular parameters are reviewed, and attention is called to the fundamental assumptions. In hypersonic gas dynamics, with the fluid at the high temperatures and low densities, the half times for chemical reactions are comparable to characteristic flow times. The corresponding terms which must be inserted in the flow equations appear as phenomenological rate constants. In the low density regimes, one should describe the system in molecular variables only; the chemical rate constants would then be replaced by averages over differential collision cross sections which are very sensitive to the molecular structures and the details of the collisions. Even for the simplest reactions, such expressions are very complex, and the data are insufficient to permit an adequate formulation. Gas dynamic procedures have permitted the extension of rate measurements to temperatures and densities not ordinarily available to the chemical kineticist. (Author)

AD-284 544 Div. 25
(TISTM/SJR) OTS price $1.75

Cincinnati U., Ohio.
NEW METHOD FOR THE DETERMINATION OF THERMAL CONDUCTIVITIES BETWEEN 1000 DEGREES AND 3000 C.
Final rept. for Feb 60-Feb 61 on Experimental Techniques for Materials Research,
by Michael Hoch and Donald A. Nitti. June 62, 59p. incl. illus. tables, 22 refs.
(Contract AF 33(616)7123, Proj. 7364)
(ASD TR 61-528) Unclassified report

DESCRIPTORS: *Thermal conductivity, *Refractory materials, *High temperature research, *Molybdenum, *Vanadium, Heat transfer, Metals, Test methods.

The heat conduction equation in a finite cylinder, heated by high frequency induction and losing heat only by radiation, has been solved. In the steady state, the cylindrical surface is at a constant temperature, and the flat circular surfaces exhibit a temperature gradient along the radius. This temperature gradient has been analytically correlated to the thermal conductivity. The thermal conductivity of molybdenum has been measured between 2100 and 2400 K and that of vanadium between 1600 and 1800 K; for molybdenum, $k = -0.0191T + 81.0$, for vanadium, $k = 0.0320T - 41.4$ BTU/hr-ft-F. (Author)

AD-284 587 Div. 25
(TISTP/FR) OTS price $1.10

Carnegie Inst. of Tech., Pittsburgh, Pa.
ELECTRON THEORY OF METALS AND SEMICONDUCTORS.
Final rept. 1 July 56-30 Nov 60,
by J. M. Radcliffe. 30 Nov 60, 7p. 18 refs.
(Contract Nonr-76013, Proj. NR 017-620)
Unclassified report

DESCRIPTORS: *Metals, *Semiconductors, Chemical impurities, Electrons.

Contents:
Semiconductor theory
Many-body treatment of semiconductors
Effects at impurities in semiconductors

Theory of shallow acceptor states in Si and Ge
Spin-lattice relaxation of shallow donors states in Ge and Si
Optical absorption spectrum of hydrogenic atoms in a strong magnetic field
Theory of metals
Bloch electrons in a magnetic field
Interaction of conduction electrons and nuclear magnetic moments in metallic Na
Analytic properties of Bloch waves and Wannier functions
Charge fluctuations round impurities in metals
Image of the Fermi surface in the vibration spectrum of a metal
Impurity resistance of metals

AD-284 611 Div. 25
(TISTP/JW) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
A METHOD FOR SOLVING FLUID FLOW PROBLEMS BY FOLLOWING THE MOTION OF ENERGY CELLS,
by Julius W. Enig. Nov 62, 22p. incl. illus. tables, 8 refs. (Rept. no. NOLTR 62-140)
Unclassified report

DESCRIPTORS: *Fluid flow, *Shock waves, Energy, Motion, Hydrodynamics, Numerical analysis, Partial differential equations, Particles.

Numerical solutions were obtained for one-dimensional fluid flow problems, involving shock and rarefaction waves by fixing attention for the first time on the energy of the fluid and following the motion of constant energy cells, each of which contains a time dependent quantity of mass. This is analogous to the usual method which consists of solving the Lagrangian hydrodynamic equations and following the motion of constant mass cells, each of which contains a time dependent amount of energy. The method was applied to problems in which the total energy of the fluid is a constant. Solution by finite difference techniques leads to a stability criterion which can be less restrictive than that obtained from the Lagrangian equations and hence give shorter computational times. (Author)

AD-284 652 Div. 25, 8
(TISTE/CAM) OTS price $4.60

Martin Marietta Corp., Orlando, Fla.
EXCITATION AND DETECTION TECHNIQUES FOR MILLIMETER WAVE TRANSITIONS.
Final progress rept., 1 Apr-1 July 62,
by J. J. Gallagher, J. W. Dees an others.
9 Aug 62, 34p. incl. illus. 19 refs. (Rept. no. 4; OR 2638)
(Contract DA 36-039-sc-87321, Proj. 3A991500102)
Unclassified report

DESCRIPTORS: *Electron transitions, Detection, Excitation, Frequency multipliers, Klystrons, Frequency stabilizers, Microwaves, Molecular beams, Waveguide couplers, Radiofrequency attenuators, Interferometers, Microwave oscillators, Microwave spectroscopy, Measurement, Silicon, Gallium compounds, Arsenides, Indium compounds, Antimonides, High pass filters.

Several crystal materials were mounted for harmonic generation and detection evaluation. Preliminary tests were performed on the RG-99/U to RG-139/U multiplier-mixer. Band-pass and high-pass filters, a directional coupler, and a quasi-optical duplexer were designed and tested. The semi-confocal interferometer plates were constructed, and tests are under way on both the plane and semi-confocal interferometers. Phase stabilization of oscillators operating from 100 to 100,000 mc were successfully demonstrated. Injection locking of klystrons, which requires no correction voltage on the reflector, is being investigated. Millimeter power measurements above 120 gc were made using the golay cell. An investigation was started to determine the relative stability and spectral purity of two millimeter signals generated by frequency multiplication from the same 10 mc crystal source. Zeeman measurements were performed on two H2S lines. (Author)

AD-284 655 Div. 25
(TISTP/WH) OTS price $1.60

Space Technology Labs., Inc., Redondo Beach, Calif.
STRUCTURAL FATIGUE UNDER COMBINED RANDOM AND SWEPT SINUSOIDAL VIBRATION,
by H. R. Spence and H. N. Luhrs. Nov 61, 14p. incl. illus. 10 refs. (Rept. no. 6110-6141-NU-000)
(Contract AF 04(694)1)
(BSD TDR 62-8) Unclassified report

DESCRIPTORS: *Vibration, *Electronic equipment, *Fatigue (Mechanics).

Combined random and swept sinusoidal vibration is used in the qualification of missile electronic equipment. The subject of this report is how structural fatigue produced by a combined excitation is related to structural fatigue produced by another combined excitation or to that produced by individually applied random or sinusoidal excitation. A method is given by which different random or combined random and sinusoidal vibration excitations can be compared. This method has practical application in comparing vibration specifications and tests, for the purpose of modifying vibration requirements from one type to another. In this derivation, sinusoidal vibration excitations and sweep rates are based on the response characteristics of a single resonator system, while amplitude and time relationships are based on the S-N diagram of the material under consideration. Equations and curves are given and their use illustrated by means of a numerical example. (Author)

AD-284 662 Div. 25, 7
(TISTM/AW) OTS price $6.60

Marks Polarized Corp., Whitestone, N. Y.
THE CONVERSION OF HEAT TO ELECTRICAL POWER BY MEANS OF A CHARGED AEROSOL.
Quarterly rept. no. 4, 1 Apr-30 June 61.
14 Nov 61, 66p. incl. illus. tables, 6 refs.
(Contract NOw 60-0831-c)
Unclassified report

DESCRIPTORS: *Heat transfer, *Electric power production, *Thermodynamics, Ions, Effectiveness, Plasma physics, Gas ionization, Mathematical analysis, Aerosols, Gases.

The electrothermodynamics of an electric generator utilizing a charged aerosol was investigated for single and multiloop Carnot cycles. Parameters related to efficiency were established for pressure, temperature and isothermal and isentropic work. The charged aerosol is a new working substance uniquely adaptable to a variety of controlled electrothermodynamic operations. Heat interchange is facilitated between the highly dispersed liquid and gas components of the aerosol. The liquid/gas mass ratio of a charged aerosol controls the modes of operation during expansion or compression, thus enabling

the predetermination of isothermal or isentropic operation, by adjusting the liquid/gas mass ratio. Electrical power is extracted during both isothermal and isentropic expansion of the charged aerosol. Compression may be effected by the reverse electrothermodynamic effect. New multiloop aerosol cycles having an overall efficiency of 60-80% appear feasible. (Author)

AD-284 681 Div. 25
(TISTP/WH) OTS price $2.60

Watertown Arsenal Labs., Mass.
LARGE DEFLECTIONS OF A TENSION STRIP CONTAINING A LARGE HOLE,
by Edward W. Ross, Jr. July 62, 22p. incl. illus. 6 refs. (Technical rept. no. WAL TR 811.8/3)
(DA Proj. 59901004)
Unclassified report

DESCRIPTORS: *Elasticity, *Tensile properties, *Load distribution, Deformation, Stresses.

A thin rectangular strip containing a large hole of fairly general shape and subjected to uniaxial tension is analyzed. An approximate, elastic-beam theory, due to Koiter, is used to find estimates of stresses, strains and displacements near the minimum sections. It is assumed that the strip deflections may be large near the minimum sections but not elsewhere. Approximations suitable to the cases of small and large loads are presented, and detailed results are given for the circular hole. (Author)

AD-284 689 Div. 25, 8
(TISTP/WH) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
PLASMA PROPULSION BY MEANS OF A HELICAL TRANSMISSION LINE,
by E. B. Mayfield, R. X. Meyer and others.
20 July 62, 14p. incl. illus. 10 refs. (Rept. no. TDR-169(3210-05)TN-1)
(Contract AF 04(695)169)
(DCAS TDR 62-145) Unclassified report

DESCRIPTORS: *Plasma jets, *Plasma physics, *Propulsion, *Electromagnetic fields, *Transmission lines, Helixes.

Studies of plasma propulsion using a helical transmission line to generate a moving magnetic field were conducted. The system consists of a conical electrical discharge driver, shock tube, and helical transmission line. The propellant gas is hydrogen at an intitial pressure of 175 microns. The shock tube driver uses a capacitor bank of 8 microfarads at 25 kv and rings at 250 kc/sec. At 10 cm from the ring electrode where the shock enters the transmission line, the shock has a velocity of 16 cm/microsec which decays to 3 cm/microfarads as it leaves the transmission line 115 cm from the electrode. The helical line has a phase velocity of 11.3 cm/microsec and a capacitance per length of 13.8 microfarads/m. The axial magnetic field is calculated to be 7100 gauss; the radial magnetic field to be 1400 gauss. Results obtained with a rotating mirror streak camera along the axis of the system show that, when the magnetic field is initiated 4-6 microsec behind the ionizing shock (30-40 cm in the tube), the shock velocity is maintained at the phase velocity of the transmission line, 11 cm/microsec. Photomultiplier and magnetic field probes indicate that the luminous shock in the gas travels with the magnetic field at the phase velocity of the line. (Author)

AD-284 696 Div. 25
(TISTP/WH) OTS price $3.60

Purdue Research Foundation, Lafayette, Ind.
SEMICONDUCTOR RESEARCH.
Quarterly rept. no. 7, 1 Apr-30 June 62.
30 June 62, 20p. incl. illus. tables.
(Contract DA 36-039-sc-87394)
Unclassified report

DESCRIPTORS: *Semiconductors, *Solid state physics, Crystals, Single crystals, Electrical properties, Hall effect, Impurities, Silicon, Germanium, Intermetallic compounds, Gallium compounds, Indium compounds, Antimonides, Zinc compounds, Tellurides.

AD-284 751 Div. 25
(TISTM/TCG) OTS price $4.60

South Dakota School of Mines and Technology, Rapid City.
MEASUREMENTS OF THERMAL CONDUCTIVITY OF SILICON FROM 680 K TO 1000 K, Master's thesis,
by Joel J. Martin and Robert G. Morris. 15 Sep 62, 39p. incl. illus. 28 refs.(Technical rept. no. 6)
(Contract Nonr-296401, Proj. NR 017-208)
Unclassified report

DESCRIPTORS: *Silicon, *Thermal conductivity, Test methods, Test equipment, Measurement, Theory, Resistance, Standards, Heat transfer, Phonons, Scattering, High temperature research, Single crystals.

The thermal conductivity of two n-type and one p-type single-crystal silicon samples was measured as a function of temperature from 680 to 1000 K using a series comparative method. The n-type samples had donor concentrations of about 5 x 10 to the 16th power/cc and the p-type sample had an acceptor concentration of about 10 to the 18th power/cc. Two Armco iron standards of approximately the same dimensions as the samples (23mm in diameter and 8mm in thickness) were placed one above and one below the sample. A mixture of sodium silicate and graphite was used to provide low thermal resistance contacts between the sample, the standards, and the sample holder. The thermal conductivity was 0.55 watt/cm C at 680K and 0.30 watt/cm C at 1000K. Between these temperatures the thermal conductivity varied nearly linearly with the reciprocal of the absolute temperature. The charge carrier contribution to the thermal conductivity could not be observed; it was calculated to be 1.8% of the total thermal conductivity. The 1/T dependence of the results indicates that phonon-phonon scattering is dominant in this temperature range. (Author)

AD-284 753 Div. 25, 7
(TISTP/JW) OTS price $8.60

Westinghouse Electric Corp., Pittsburgh, Pa.
LONG LIFE CLOSED LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
Interim scientific rept. no. 2, 15 June-15 Sep 62.
Sep 62, 85p. incl. illus. tables.
(Contract AF 33(657)8311)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Generators, *Ducts, Plasma jets, Thermodynamics, Heat exchangers, Magnetic fields, Cesium, Helium.

AD-284 756 Div. 25
(TISTM/TCG) OTS price $1.60

Raytheon Co., Waltham, Mass.
THE ELASTIC CONSTANTS OF STRONTIUM TITANATE.

Scientific rept. no. 5 on Investigation of the Microwave Properties of Ferroelectrics,
by R. O. Bell and G. Rupprecht. Aug 62, 9p. illus. 13 refs. (Rept. no. S-456)
(Contract AF 19(604)8005, Proj. 4600)
(AFCRL 62-594) Unclassified report

DESCRIPTORS: *Ferroelectric materials, *Strontium compounds, *Titanates, *Elasticity, Ferroelectric crystals, Lattices, Phase transitions, Crystal structure, Dielectric properties, Frequency, Theory, Temperature, Ultrasonics, Single crystals.

The elastic constants c sub 11, c sub 12, and c sub 44 of single crystal strontium titanate have been measured as a function of temperature from 300 to 112 K by determining the velocity of an ultrasonic wave. At 112 K, the strontium titanate undergoes a phase transition to a tetragonal structure which causes a marked change of the elastic properties and the appearance of a domain structure, but does not cause a discontinuity of the dielectric constant. The phase transition is free of hysteresis. The dependence of the elastic properties on a dc electric field parallel to the velocity of sound propagation was measured and found independent of the dielectric properties. The implications of this result are discussed. (Author)

AD-284 808 Div. 25
(TISTP/JW) OTS price $1.10

Ohio State U. Research Foundation, Columbus.
STUDY OF THE BEHAVIOR OF SOLIDS IN ALTERNATING AND CONSTANT MAGNETIC FIELDS.
Final rept. 1 Jan 58-30 Sep 62,
by Jan Korringa. Sep 62, 3p. (Rept. no. 19)
(Contract AF 49(638)264, Proj. 9760)
Unclassified report

DESCRIPTORS: *Magnetic fields, *Solids, Bibliography.

AD-284 810 Div. 25, 4
(TISTM/ODN) OTS price $9.10

Raytheon Co., Waltham, Mass.
RESEARCH ON THE CHEMISTRY AND SINGLE CRYSTAL GROWTH OF MAGNETIC OXIDES.
Final rept.,
by H. J. Van Hook, A. E. Paladino and others.
31 July 62, 92p. incl. illus. tables, 47 refs.
(Rept. no. S-459)
(Contract AF 19(604)8474, Proj. 4608)
(AFCRL 62-701) Unclassified report

DESCRIPTORS: *Oxides, *Yttrium compounds, *Iron compounds, *Aluminum compounds, Crystals, Spinel, Ferrites, Magnesium compounds, Nickel compounds, Structures, X-ray diffraction analysis, Magnetic properties, Electrical conductance, High temperature research, Magnetic moments, Cooling, Induction heating, Ions, Theory, Liquids, Pressure, Melting, Single crystals, Magnetic materials, Oxygen, Phase studies.

Phase relationships in the liquidus range under different O2 partial pressures are summarized for the system iron oxide-yttrium oxide, and detailed results of phase relations obtained by Al substitution in Y-Fe garnet are presented. Various methods of crystal growing are reviewed, and results of Czochralski growth of Y-Fe garnet are discussed. Subsolidus phase relations are presented for the system FeO-Fe2O3-Al2O3. This system has been studied because of the interest in electrical conductivity processes in magnetite derived spinels. It allows for a trivalent substitution in Fe3O4, compared with the divalent substitutions such as Ni, Co and Mg. Conductivity data obtained on samples of Ni substitutions in magnetite confirm a proposed model describing electrical conductivity in such systems. Cation distribution studies by X-ray intensity measurements and magnetic moment determinations have been made on the terminal composition of Mg substituted magnetite and are reported. (Author)

AD-284 816 Div. 25
(TISTM/REB) OTS price $1.60

Uppsala U. (Sweden).
SOME RECENT PROGRESS IN THE QUANTUM THEORY OF MANY-ELECTRON SYSTEMS,
by Per-Olov Lowdin. 15 Aug 62, 15p. refs. (Technical note no. 83)
(Contract AF 61(052)351)
(ARL 62-444) Unclassified report

DESCRIPTORS: *Quantum mechanics, *Molecular structure, *Atomic structure, *Molecular spectroscopy, Symposia.

Summaries of four papers presented at the International Symposia on Molecular Structure and Spectroscopy in Japan in September 1962: (1) Connection between partitioning technique, perturbation theory, and variation principle in the quantum theory of atoms and molecules. (2) The Huckel approximation in the theory of conjugated system in view of recent progress in treating the many-electron wave equation. (3) Change of bond lengths under addition and substitution and Pauling's concept of electronegativity treated by partitioning technique. (4) Quantum theory of the electronic and protonic structure of large molecules. (Author)

AD-284 833 Div. 25
(TISTP/MS) OTS price $2.60

Emmanuel Coll. Research Language Center, Boston, Mass.
THE USE OF THE SURFACE IMPEDANCE CONCEPT IN THE THEORY OF ELECTROMAGNETIC SURFACE WAVES,
by M. A. Miller and V. I. Talanov, tr. by Zanis Stuberovskis. Mar 62, 29p. 227 refs.
(Trans. no. ETR 62-22A from Bulletin of Higher Education Institutions, MVO, Radio Physics 4:5, pp. 823-230, 1961)
(Contract AF 19(604)8505)
Unclassified report

DESCRIPTORS: *Bibliography, *Electromagnetic waves, *Electromagnetic theory, Surface properties, Impedance, USSR, Electromagnetism.

AD-284 835 Div. 25
(TISTP/MS) OTS price $5.60

Emmanuel Coll. Research Language Center, Boston, Mass.
THE USE OF THE SURFACE IMPEDANCE CONCEPT IN THE THEORY OF ELECTROMAGNETIC SURFACE WAVES (A REVIEW),
by M. A. Miller and V. I. Talanov, tr. by Zanis Stuberovskis. June 62, 57p.
(Trans. no. ETRR 62-22 from Reports of Higher Educational Institutions, Radiophysics 4:5, pp. 795-830, 1961)
(Contract AF 19(604)8505)
Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Electromagnetic theory, Electromagnetism, Surface properties, Wave guides, Wave transmission, USSR, Impedance.

Certain general problems in the theory of electromagnetic surface waves related to the impedance description of the guiding properties

of interfaces are reviewed. The surface impedance may have spatial dispersion, i. e., and may depend on the structure of the field which it determines. The value of such a description is demonstrated for the study of free waves and for the solution of the problem of surface field excitation by means of various sources (including diffraction). Only those studies are discussed that deal directly with the use of the surface impedance concept. The appended bibliography is more complete: it contains references to nearly all the main articles on electromagnetic surface waves which have been published during the last few years. (Author)

AD-284 836 Div. 25
(TISTP/MS) OTS price $1.60

Emmanuel Coll. Research Language Center, Boston, Mass.
ON THE CORRECT UNDERSTANDING TO THE THEORY OF RELATIVITY,
by M. F. Shirokov, tr. by Zanis Stuberovskis.
1962, 13p. (Trans. no. ETRR 62-24 from Bulletin ''Questions on Philosophy'' No. 5, pp. 133-137, 1961)
(Contract AF 19(604)8505)
Unclassified report

DESCRIPTORS: *Relativity theory, USSR, Analysis.

AD-284 837 Div. 25
(TISTP/TL) OTS price $1.10

Emmanuel Coll. Research Language Center, Boston, Mass.
MINERAL SYNTHESIS BY DIFFUSION,
by L. G. Berg, tr. by Zanis Stuberovskis.
June 62, 6p. incl. illus. (Trans. no. ETRR 62-32 from Nature No. 7, pp. 95-97, 1957)
(Contract AF 19(604)8505)
Unclassified report

DESCRIPTORS: *Minerals, *Synthesis, *Diffusion, Low temperature research, Pressure, Crystals, Growth, Ions, Chemical reactions, Strontium compounds, Sulfates, Chlorides.

AD-284 851 Div. 25
(TISTP/WH) OTS price $.75

Illinois U., Urbana.
AN APPLICATION OF LINEAR HARDENING PLASTICITY THEORY TO CYCLE AND PATH DEPENDENT STRAIN ACCUMULATION.
Summary rept., Apr 61-Jan 62 on Metallic Materials,
by P. D. Schwiebert and G. J. Moyar. Aug 62, 25p. incl. illus. 24 refs.
(Contract AF 33(616)8177, Proj. 7351)
(ASD TDR 62-730) Unclassified report

DESCRIPTORS: *Metals, *Plasticity, *Stresses, *Fatigue (Mechanics), Creep, Deformation, Metallurgy.

This analysis is a combination of four distinct but closely related topics. The first is a documentation of the existence of cycle and path dependent plastic deformation. The second is a resume of existing plasticity theories to determine if any existing theory in the realm of mechanics of solids can include the observed phenomenon. The third and essentially original section involves the specialization of an existing theory of inelastic deformation. Included is a discussion of the nature of the specialized theory from a plasticity viewpoint and the application of the theory to a particular complex cyclic stress history. Equations are developed that predict, as a function of cycles, the plastic strain accumulation under conditions of constant axial stress and alternating shear stress in a thin wall tube. The fourth topic is a discussion of present experimental results in the light of theoretical applicability and suggested modifications to include a greater range of material behavior. (Author)

AD-284 852 Div. 25, 4
(TISTM/ODN) OTS price $1.60

Noyes Chemical Lab., U. of Illinois, Urbana.
PROTON MAGNETIC RESONANCE STUDIES OF POLYCRYSTALLINE URANIUM OXIDES HYDRATES. III. UO4(2H2O),
by A. L. Porte, H. S. Gutowsky and J. E. Boggs.
19 June 62, 14p. incl. illus. 22 refs.
(Technical rept. no. 54)
(Contract Nonr-183413, Proj. NR 051-215; In cooperation with Glasgow U. and Texas U.)
Unclassified report

DESCRIPTORS: *Uranium compounds, *Nuclear magnetic resonance, *Oxides, *Hydrates, Peroxides, Oxygen, Protons, Magnetic properties, Crystals, Analysis, Absorption, Theory, Cryogenics.

The broad-line proton magnetic resonance spectrum of polycrystalline samples of the compound formulated empirically as UO4(2H2O) has been investigated in the temperature range 77 to 356 K. Analyses of the absorption line shapes, and their derivatives, at 77 K and 257, coupled with chemical analysis for peroxide oxygen, show that the compound is essentially the dihydrate of uranyl peroxide, UO2(O2).2H2O. The sample investigated contains about 15% of a second component, possibly a hydroperoxide, UO(OH)3(OOH), or hydroxy peroxide, UO(OH)2(O2).H2●. At temperatures between 125 and 210 K, the absorption of the OH protons in this component undergoes changes which are compatible with self diffusion. The apparent activation energy for the motion is 2 kcal. The two component formulation of the 'compound' accounts for most, if not all, of its complex chemical behavior. (Author)

AD-284 883 Div. 25
(TISTP/WH) OTS price $.75

Picker X-Ray Corp., Cleveland, Ohio.
A PROGRAM OF BASIC RESEARCH TO STUDY X-RAY SPECTRA IN THE REGION 15 TO 50 ANGSTROMS.
Final rept., Mar 61-May 62 on Experimental Techniques for Materials Research,
by Donald W. Beard and Thomas C. Furnas.
Aug 62, 24p. incl. illus. tables, refs.
(Contract AF 33(616)8040, Projs. 7360 and 7364)
(ASD TDR 62-519) Unclassified report

DESCRIPTORS: *X-ray spectrum, *Bibliography, X-ray spectroscopy, Instrumentation.

Performance tests were completed on a vacuum spectrographic system. High-intensity X-ray excitation was found to produce low working intensities, and was not useful in the detection and analysis of low energy X-rays. Electron excitation provided satisfactory intensities, and made possible the measurement of radiation as 'soft' as carbon (44A), as well as the L series spectra from transitional elements. A wave length shift in the L alpha line was observed between metallic iron and iron in the form of the oxide. A Bendix M-304 detector was studied and found to give non-proportional response to incident photon energy, but it did maintain a low noise level. (Author)

AD-284 886 Div. 25, 1
(TISTP/WH) OTS price $.75

Southampton U. (Gt. Brit.).
FURTHER ANALYSIS OF THE RANDOM VIBRATIONS OF THE CARAVELLE TEST SECTION.
Final rept., Dec 60-Sep 61 on Metallic Materials, by B. L. Clarkson and R. D. Ford. July 62, 23p. incl. illus. tables, 2 refs.
(Contract AF 61(052)332, Proj. 7351)
(ASD TDR 62-681) Unclassified report

DESCRIPTORS: *Vibration, *Jet engine noise, *Airframes, *Metal plates, Acoustics, Fatigue (Mechanics).

Further tests were made on the Caravelle aircraft test section. The vibrations, induced by jet-noise, of a row of eight panels in the side of the rear fuselage were analyzed and it was confirmed that the skin panels tend to vibrate in fundamental modes with adjacent panels out of phase with each other so causing the intermediate stringers to twist. Due, presumably, to variations in the panel sizes, no more than three panels were observed to couple in such a mode. The vibrations of the panels on the upper surface of the outboard elevator were also analyzed. It was found that the ribs act as stiff supports but the vibrations of the two panels between any pair of ribs are coupled in the lower-frequency modes. The mode shapes were not satisfactorily determined owing to lack of sufficient strain-gauges on the panels, but it is deduced that the stresses in the ribs are caused by direct inertia loading from the supported panels. (Author)

AD-284 887 Div. 25
(TISTP/WH) OTS price $.50

Southampton U. (Gt. Brit.).
TORSIONAL VIBRATIONS OF A FREE RECTANGULAR PLATE.
Final rept., Nov 60-Nov 61 on Metallic Materials, by D. J. Mead and R. F. Beresford. July 62, 13p. incl. illus. 3 refs.
(Contract AF 61(052)504, Proj. 7351)
(ASD TDR 62-701) Unclassified report

DESCRIPTORS: *Torque, *Sheets, *Vibration, *Shear stresses, Deformation, Elasticity, Differential equations.

The effect of bending distortion of the cross-section on the torsional modes and frequencies of a uniform rectangular plate is considered. The bi-harmonic plate equation is integrated to yield the transcendental frequency equation for modes of any specified longitudinal wavelength, the effects of shear distortion and rotatory inertia associated with bending being ignored. The long wavelength solution is shown to be well approximated by the results from the simple torsional theory based on the St. Venant and Wagner-Kappus torsion theories. At shorter wavelengths, the simple theory still gives a good approximation to the frequencies of vibration, but considerable distortion of the cross-section is found to occur. Certain limiting conditions of very short wavelength are also investigated. (Author)

AD-284 898 Div. 25, 4
(TISTM/ODN) OTS price $1.10

Cornell U., Ithaca, N. Y.
SPECIES IN CONCENTRATED AQUEOUS SOLUTIONS.
Final rept.,
by Robert A. Plane. 23 Aug 62, 5p.
(Contract AF 49(638)279, Proj. 19750)
Unclassified report

DESCRIPTORS: *Solutions, *Inorganic substances, *Raman spectroscopy, Complex ions, Polymerization, Polymers, Hydrates, Ions.

A discussion is presented of data obtained from Raman spectroscopy, and a range of topics important for the characterization of the molecular species present in concentrated aqueous solutions including complex ions, hydrated ions, and low molecular weight inorganic polymers. (Author)

AD-284 899 Div. 25
(TISTP/WH) OTS price $3.60

Columbia U., New York.
STRESSES AND CRITICAL STATES OF ELASTIC-PLASTIC AND NONLINEAR ELASTIC HOLLOW CYLINDER,
by A. M. Freudenthal and M. Shinozuka. July 62, 33p. incl. illus. table, 5 refs. (Technical rept. no. 14; Rept. no. CU-14-62-ONR 266(78)CE)
(Contract Nonr-26678, Proj. Nonr 064-446)
Unclassified report

DESCRIPTORS: *Elasticity, *Elastic shells, *Cylindrical bodies, *Stresses, Non-linear systems.

An elastically case-bonded hollow cylinder of infinite length, the mechanical response of which is perfectly elastic-plastic or nonlinearly elastic, is considered. For a perfectly elastic-plastic cylinder with the Tresca yield condition and its associated flow rule, W. T. Koiter's solution is extended to the present problem where the cylinder is contained in an elastic shell, and the effect of the shell on the stresses is demonstrated with numerical examples. For a nonlinear elastic cylinder, the second invariants J and I of the stress and strain deviator respectively are assumed to have a relation J = 4I(G-gI) to the 2nd power, G and g being material constants; incompressibility is introduced to make the analysis simple. The critical state is defined in such a way that failure occurs at the point where I reaches a critical value, I sub cr. Comparison of the stresses in the elastic-plastic and in the nonlinear elastic cylinder for the inner surface of the cylinder reaching the critical condition shows little difference, at least for the specific values of parameters chosen for computation. (Author)

AD-284 906 Div. 25, 4
(TISTM/TCG) OTS price $5.60

Noyes Chemical Lab., U. of Illinois, Urbana.
ANALYSIS OF A2B2 HIGH RESOLUTION NMR SPECTRA. I. FURAN, THIOPHENE AND DISUBSTITUTED BENZENES,
by David M. Grant, Robert C. Hirst, and H. S. Gutowsky. 22 Mar 62, 55p. incl. illus. 18 refs.
(Technical rept. no. 49)
(Contract Nonr-183413, Proj. NR 051-215)
Unclassified report

DESCRIPTORS: *Nuclear magnetic resonance, *Spectrographic analysis, *Thiophenes, *Furan, *Benzenes, Phenyl radicals, Nuclear spins, Matrix algebra, Mathematical analysis, Theory.

The features of certain classes of A2B2 spectra are investigated systematically relative to the parameters involved, and these characteristic spectra are given as an aid to future interpretation. The effects upon the spectra are given as an aid to future interpretation. The effects upon the spectra of the relative signs of the coupling constants are discussed. Examples are provided by the analysis of spectra for the aromatic protons in furan, thiophene, 3 symmetrical ortho disubstituted benzenes, 2 non symmetrical para disubstituted benzenes and a symmetrical 4,4'-disubstituted biphenyl. Better resolution than was obtainable in previous studies permitted a more detailed analysis for compounds cited earlier. In most examples the 24 main

spectral lines expected for 4 spin systems of this symmetry were observed. The disubstituted benzenes studied have 2 non-equivalent ortho or meta coupling constants; they are found to differ by as much as 0.6 cps. The spectrum of each of these substituted benzenes can be interpreted with coupling constants all of the same relative sign. (Author)

AD-284 913 Div. 25
(TISTP/WH) OTS price $14.50

Institute of Field Physics, U. of North Carolina, Chapel Hill.
THE QUANTIZATION OF GEOMETRY,
by Bryce S. DeWitt. Nov 60, 1v. incl. illus. refs. (Publication no. 8)
(Contract AF 49(638)563)
Unclassified report

DESCRIPTORS: *Gravity, *Relativity theory, *Quantum mechanics, Green's function, Statistical distributions, Partial differential equations.

AD-284 933 Div. 25, 4
(TISTM/TCG) OTS price $5.60

Varian Associates, Palo Alto, Calif.
ELECTRON PARAMAGNETIC RESONANCE OF AROMATIC AND ALIPHATIC NITRO ANIONS IN AQUEOUS SOLUTION,
by L. H. Piette, Peter Ludwig and Ralph N. Adams. 1962, 1v. incl. illus. tables, refs.
(In cooperation with Kansas U., Lawrence)
Unclassified report

DESCRIPTORS: *Aliphatic compounds, *Nitrogen compounds, *Benzonitriles, *Ions, *Organic compounds, Electron microscopy, Paramagnetic resonance, Water, Solutions, Exchange reactions, Electrochemistry, Voltage, Voltage amplifiers, Volt meters, Electrodes, Electrolysis, Nitro radicals.

This rept. includes:
Kansas U., Lawrence.
EXCHANGE INTERACTION WITH ELECTROLYTICALLY GENERATED BENZONITRILE NEGATIVE ION,
by Peter Ludwig and Ralph N. Adams. 1962, 6p. illus.

Kansas U., Lawrence.
TRIANGULAR WAVE CYCLIC VOLTAMMETRY,
by Z. Galus, H. Y. Lee and Ralph N. Adams. 1962, 10p. illus.

Kansas U., Lawrence.
OPERATIONAL AMPLIFIER CIRCUITS FOR CONTROLLED POTENTIAL CYCLIC VOLTAMMETRY, by John R. Alden, James Q. Chambers and Ralph N. Adams. 1962, 7p. illus.

Contents:
Electron paramagnetic resonance of aromatic and aliphatic nitro anions in aqueous solution, by L. H. Piette
Exchange interaction with electrolytically generated benzonitrile negative ion, by P. Ludwig and R. N. Adams
Triangular wave cyclic voltammetry, by Z. Galus, H. Y. Lee, and R. N. Adams
Operational amplifier circuits for controlled potential cyclic voltammetry, by J. R. Alden, J. Q. Chambers, and R. N. Adams

AD-284 944 Div. 25, 15, 2
(TISTP/GRW) OTS price $4.60

Bell Telephone Labs., Inc., Whippany, N. J.
A STUDY OF THE BIVARIATE DISTRIBUTION FUNCTION OF OCEAN NOISE,
by A. H. Green, Jr. 13 Apr 62, 41p. incl. illus. tables, 7 refs. (Technical rept. no. 10)
(Contract Nonr-246100, Proj. NR 261-111)
Unclassified report

DESCRIPTORS: *Underwater sound, *Acoustics, *Statistical tests, Statistical distributions, Statistical processes, Analysis of variance, Low frequency.

The assumption that ocean noise may be represented as a gaussian process is often made in practical applications relating to research in underwater acoustics. Statictical tests are discussed for normality applied to experimental data obtained for a limited number of samples of low frequency sea noise. The tests include the chi-square goodness of fit test and tests involving the second, third, and fourth order product-moments. The conclusion is that on the basis of these methods and for the data sampled there is no sufficient reason for rejecting the assumption of gaussianity of ocean noise. (Author)

AD-285 022 Div. 25, 14
(TISTM/TCG) OTS price $4.60

Bausch and Lomb, Inc., Rochester, N. Y.
INFRARED COATING STUDIES.
Quarterly rept. no. 1, 15 Feb-15 May 62,
by T. P. Martin. 15 May 62, 25p. illus. table, 13 refs.
(Contract DA 44-009-eng-4954, Proj. 8F23-11-001-05; Continuation of Contract DA 44-009-eng-4686)
Unclassified report

DESCRIPTORS: *Infrared films, *Coatings, *Crystals, Ions, Thin films, Lithium compounds, Fluorides, Chemical reaction, Reflection, Scattering, Crystal structure, Particles, Test methods, Measurement, X-ray diffraction analysis.

Contents:
Discusssion of the interaction of infrared radiation with ionic crystals
Dependence of the reststrahlen of thin films of LiF on particle size
Experimental technique and reflection measurements
Determination of particle size
Dispersion analysis
Interpretation of data
Survey of reststrahlen in the 15 to 38 micron region

AD-285 023 Div. 25
(TISTP/WH) OTS price $1.10

Boeing Scientific Research Labs., Seattle, Wash.
NUCLEAR MAGNETIC RESONANCE IN METAL SINGLE CRYSTALS,
by Harlan E. Schone. Aug 62, 7p. illus. 2 refs.
(Rept. no. D1-82-0194)
Unclassified report

Also available from author.

DESCRIPTORS: *Nuclear magnetic resonance, *Single crystals, *Solid state physics.

Resonances have been observed in this laboratory in single crystals of Copper, Cadmium, Lithium, Vanadium, and Niobium. (Author)

AD-285 031 Div. 25
(TISTP/WH) OTS price $1.10

Parsons, C. A. and Co., Ltd. (Gt. Brit.).
THERMAL IONIZATION IN A SYSTEM WITH A DISTRI-

BUTION OF IONIZATION POTENTIALS,
by A. Maitland and M. H. Dunn. Aug 62, 4p. illus. table, 4 refs. (Rept. no. NRC 62-76)
(Contract N62558-3127)
Unclassified report

DESCRIPTORS: *Plasma physics, *Electric fields, *Atomic spectrum, *Ionization, *Hydrogen, High temperature research.

In a hydrogen plasma the microfields act upon the neutral atoms and cause Stark effects which result in a distribution of ionization potentials. In this report the distribution function is derived and used with the Saha equation to calculate the electron densities which are then compared with those calculated from a single ionization potential derived from an average microfield given by CeN sub e quantity to the 2/3 power where C has been calculated as 4.2, 3.7 and 2.6, depending on the method of averaging. The temperature range considered is 5750 to 10700 K in which the electron densities are between 10 to the 14th to 17th power per cc when the neutral particle densities are between 10 to the 17th to 19th power per cc. Within these ranges, calculation using the distribution equation gives values up to about 2% greater than that given by the Saha equation using the ionization potential of an isolated atom, whereas the electron density calculated from a single ionization potential based on an average field is up to about 1% greater. It is shown that the population of neutral atoms which can be excited to levels with high principal quantum number is dependent upon the electron density. (Author)

AD-285 032 Div. 25
(TISTP/WH) OTS price $1.10

Parsons, C. A. and Co., Ltd. (Gt. Brit.).
THE ENERGY OBTAINABLE FROM A CARNOT ENGINE WITH A THERMALLY IONIZED GAS AS THE WORKING FLUID,
by M. H. Dunn and A. Maitland. Aug 62, 2p. illus. (Rept. no. NRC 62-77)
(Contract N62558-3127)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Plasma physics, *Gas generator engines, *Gas ionization.

In a closed cycle magnetoplasmadynamic generator the degrees of seeding and ionization affect not only the processes for the extraction of energy but also, as a consequence of the additional energy removed from the high temperature source in ionizing the seed material, the total work available per cycle. To optimize this gain the volume expansion ratio at the high temperature source should be as large as possible. (Author)

AD-285 033 Div. 25
(TISTP/WH) OTS price $1.10

Parsons, C. A. and Co., Ltd. (Gt. Brit.).
A CRITERION FOR ASSESSING METHODS OF PRODUCING NON-EQUILIBRIUM IONIZATION,
by A. Maitland. Aug 62, 4p. illus. 5 refs.
(Rept. no. NRC 62-78)
(Contract N62558-3127)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Gas ionization, *Plasma physics, *Power, Potassium, Cesium.

The ratio, n, of the energy required to produce one more ion-electron pair in a gas at a given temperature by a non-equilibrium method to that required by thermal ionization forms the basis for assessment of the non-equilibrium method. The proposed criterion is that n is less than or equals 1. The case of photoionization of caesium-helium mixtures is considered as an example of the method. (Author)

AD-285 043 Div. 25
(TISTP/JW) OTS price $7.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
HYDROMAGNETIC EMISSIONS, X-RAY BURSTS, AND ELECTRON BUNCHES.
Final rept.,
by L. R. Tepley and R. C. Wentworth. July 62, 1v. incl. illus. tables, refs.
(Contract AF 19(604)5906, Proj. 5631)
(AFCRL 62-552) Unclassified report

DESCRIPTORS: *Hydrodynamics, *X-ray diffraction analysis, Oscillation, Electrons, Motion, Noise, Magnetic storms, Frequency, Absorption.

Recent experimental results are presented about the occurrence, structure, and frequency latitude dependence of hydromagnetic emissions (regular oscillatory micropulsations in the frequency range of 0.4 to 7 cps). Results are also presented for the occurrence of noise bursts (irregular micropulsations in the same frequency range). Evidence is considered which suggests that both hm emissions and noise bursts are generated by related mechanisms. The existence of bunches of monoenergetic electrons oscillating back and forth along field lines in the magnetosphere has been suggested by a number of workers to explain various geophysical phenomena. The simultaneous occurrence of X-ray and hydromagnetic-emission bursts (regular oscillatory micropulsations at frequencies in the range of 1 to 2 cps) immediately after sudden commencements and during magnetically disturbed periods raises the possibility that hm emissions could be generated by such electron bunches. A model is presented that considers certain aspects of the motion of geomagnetically trapped electrons relevant to the production of hm emissions by electron bunches. A new result is the calculation of electron motion in a dipole field confined to the interior of a sphere (as a first approximation to the solar wind cavity). (Author)

AD-285 061 Div. 25
(TISTP/WH) OTS price $2.60

Davos Observatory (Switzerland).
INVESTIGATION ON THE SPECTRAL INTENSITY OF ULTRAVIOLET SKY AND SUN PLUS SKY RADIATION UNDER VARIOUS CONDITIONS AT 1590 M A.S.L.
Final technical rept.,
by Paul Bener. May 62, 24p. 20 refs.
(Contract AF 61(052)54)
(AFCRL 62-1011) Unclassified report

DESCRIPTORS: *Ultraviolet radiation, *Solar spectrum, *Sky brightness, *Ultraviolet spectroscopy, *Ozone, *Atmosphere.

AD-285 085 Div. 25
(TISTM/EJH) OTS price $1.60

Alloyd Corp., Cambridge, Mass.
A FUNDAMENTAL STUDY OF ROLLING CONTACT FATIGUE.
Quarterly progress rept. no. 5, 1 May-1 Aug 62, by M. J. Hordon. 1 Aug 62, 17p. incl. illus. tables, 11 refs.
(Contract NOw 61-0656-c)
Unclassified report

DESCRIPTORS: *Deformation, *Fatigue (Mechanics), *Lithium compounds, *Fluorides, *Single

crystals, Crystals, Stresses, Surfaces, Loading, Spheres, Nylon, Polymers, Fluorides, Ethylenes, Chemical milling, Preparation, Friction, Rolling mills.

Spheres of Nylon and Teflon material were rolled at constant speed over a (001) surface of carefully prepared crystals of LiF under applied loads ranging from 1 to 400 gms. in the rolling contact apparatus. Under the impact of the applied load, a narrow deformation track, revealed by a high dislocation etch pit density, was left in the wake of the rolling sphere. Within the track, etch pits were clustered in localized areas probably caused by submicroscopic asperities in the surfaces of contact. Orthogonal (110) slip bands were generally observed to be aligned parallel and normal to the rolling direction at moderate stress levels; however, at higher stresses, the two other available slip systems were also observed. The experimental load data are generally in good agreement with theoretical considerations. (Author)

AD-285 107 Div. 25, 8
(TISTM/EJH) OTS price $1.60

Solid State Materials Corp., East Natick, Mass.
INVESTIGATION OF THE GROWTH OF OPTICAL CRYSTALS.
Final rept.,
by J. B. Schroeder. 31 July 62, 5p. illus.
(Contract AF 19(604)8846, Proj. 5621)
(AFCRL 62-593) Unclassified report

DESCRIPTORS: *Lasers, *Ruby, *Sapphires, *Aluminum compounds, Single crystals, Synthetic gems, Impurities, Oxides, Fluorides, Calcium compounds, Barium compounds, Tungstates, Molybdates, Lead compounds, Crystals, Growth, Crystal ovens.

Experimental work was aimed at developing techniques capable of growing optical quality crystals for solid state LASER applications. The scope of this program was confined to the growth of doped crystals, and in particular to Al2O3, CaF2, BaF2, PbMoO4, and CaWO4. A lack of evaluation data hampered efforts to evolve improved growth procedures throughout the program. To partially remedy this situation, data obtained on similar crystals grown under Company sponsored programs are included in an attempt to point the direction of future programs. (Author)

AD-285 140 Div. 25
(TISTP/JW) OTS price $7.60

Columbia U. School of Engineering, New York.
SOME RESULTS ON ELECTROMAGNETIC SURFACE WAVE PROPAGATION ALONG INHOMOGENEOUS CYLINDERS,
by A. Vigants and S. P. Schlesinger. 10 Jan 62, 70p. incl. illus. tables, 14 refs. (Rept. no. CU-19-62-AF-3879-EE; Scientific rept. no. 70)
(Contract AF 19(604)3879, Proj. 4600)
(AFCRL 62-313) Unclassified report

DESCRIPTORS: *Wave characteristics, *Matrix algebra, *Electromagnetic waves, Computer logic, Programming, Equations, Surface properties, Boundary layer, Fluid flow, Cylindrical bodies.

Previously derived theory has been applied in a determination of HE sub 21 and EH sub 21 mode parameters for a particular set of cylinders with radial permittivity variation. The permittivity has been represented by the first three terms of a power series in terms of the radius. The results are discussed, and some of the theoretical data are verified experimentally. For the range of permittivities considered empirical expressions are derived for HE sub 21 and EH sub 21 mode cutoffs which may be useful in preliminary design. Computer programs and a discussion of the numerical method used are included. (Author)

AD-285 146 Div. 25
(TISTP/JW) OTS price $1.10

Electronic Defense Lab., Mountain View, Calif.
SMALL AMPLITUDE ELECTRO-ACOUSTIC PLASMA OSCILLATIONS,
by Robert A. Weir and A. F. Wickersham, Jr.
27 July 62, 6p. (Technical memo. no. EDL-M488)
(Contract DA 36-039-sc-89262)
Unclassified report

DESCRIPTORS: *Plasma oscillations, *Electrostatics, *Acoustics, Electrons, Energy, Equations, Amplitude modulation, Fluid flow, Ionization.

Electrostatic-acoustic disturbances will propagate with but slight-attenuation through an ionized medium, even if the medium includes high concentrations of neutral particles. Thus a propagation mode must exist in which most of the kinetic energy resides in the electrons, rather than the ions. A theory is obtained comprising both an ionic and an electronic mode, by deriving a set of differential equations which describe small amplitude, longitudinal, coherent oscillations in the plasma. Such a theory is briefly compared with recent observations. (Author)

AD-285 181 Div. 25, 2
(TISTP/WH) OTS price $1.10

Massachusetts Inst. of Tech., Cambridge.
BASIC SPECTRAL DATA FOR THE ROTATION BAND OF WATER VAPOR.
Final rept.,
by L. D. Kaplan. Sep 62, 4p.
(Contract AF 19(604)7995, Proj. 8603; In cooperation with Laboratory of Astrophysics and Physical Meteorology, Johns Hopkins U., Baltimore, Md., Contract AF 19(604)6130)
(AFCRL 62-881) Unclassified report

DESCRIPTORS: *Wave transmission, *Atmosphere, *Molecular rotation, *Water vapor, *Molecules, *Molecular spectroscopy.

AD-285 225 Div. 25, 4
(TISTM/ODN) OTS price $5.60

Catholic U. of America, Washington, D. C.
THE INFRARED SPECTROSCOPY OF LIPIDES AND RELATED COMPOUNDS.
Master's thesis,
by Joel Albert Tolson. Sep 62, 54p. incl. illus. tables, 26 refs.
Unclassified report

DESCRIPTORS: *Lipids, *Infrared spectroscopy, Sodium compounds, Chlorides, Trypsin, Proteins, Ethanols, Amines, Cholines, Clycerols, Phosphates, Carbohydrates, Hexoses, Stearic acids.

Several lipide protein complexes were investigated by the empirical 'group frequency' method of qualitative IR structural analysis by obtaining, interpreting, comparing and correlating the IR spectra of the complexes and several related and constituent compounds. The major absorption bands of the complexes, related and constituent compounds, showed that the complexes contained all of the lipides examined in this study. By IR techniques the qualitative structural analysis of the lipide protein complexes was confirmed. Cerebrosides was the most abundant lipide and sphingomyelin the least abundant lipide found in

this series of complexes. Each of the major absorption bands in the NaCl region was interpreted and possible group vibrational assignments made. Possible assignment of group vibrations to the major absorption bands in the far IR region were not made. The broad band IR spectra of the various compounds confirmed and complimented the structural analysis obtained from an interpretation of the NaCl region spectra. Extensive experimental work was done in the development of a suitable sampling technique. (Author)

AD-285 253 Div. 25
(TISTP/MS) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
INTERACTION OF MICROWAVE RADIATION WITH A WEAKLY IONIZED GAS,
by A. Peskoff. Feb 62, 31p. incl. illus. table, 6 refs. (Rept. no. R62SD8)
(Contract AF 30(602)1968)
Unclassified report

DESCRIPTORS: *Microwaves, *Plasma physics, *Electrons, Electric fields, Ions, Propagation, Partial differential equations, Elastic scattering, Energy.

Propagation of intense microwaves in a plasma is studied. Simplified considerations are used to study the energy gain of an electron acted on by an alternating electric field, collisions with heavy particles, and collisions with other electrons. The conditions, under which each of these instances is important, are illustrated. The Boltzmann equation is applied to a plasma in which conditions vary slowly compared to the time-variation of the applied microwave field. Elastic, excitation, and ionization collisions are included in the analysis. The current-versus-voltage relation is studied for several idealized collision cross sections under steady state conditions. The dispersion relation is derived, and is found to depend on the electric field intensity. A variational principle is given which may prove useful in finding the ionization rate, using a trial function for the electron velocity distribution function. (Author)

AD-285 254 Div. 25
(TISTM/EJH) OTS price $4.60

Honeywell Research Center, Hopkins, Minn.
THE ANISOTROPIC EXTENSION OF MICROCRACKS BY PLASTIC FLOW IN SEMI-BRITTLE SOLIDS,
by R. J. Stokes and C. H. Li. Aug 62, 40p. incl. illus. 18 refs. (Technical rept. no. 17; Rept. no. HR-62-281)
(Contract Nonr-245600, Proj. NR 032-451)
Unclassified report

Presented at A.I.M.E. International Conference on Fracture, 20-24 Aug 1962, at Seattle.

DESCRIPTORS: *Brittle materials, *Plastic flow, *Fracture (Mechanics), *Sodium compounds, *Chlorides, Single crystals, Crystals, Deformation, Low temperature research, Temperature, Mechanical properties.

A mechanism for the growth of microcracks from subcritical to critical Griffith dimensions by plastic flow is described. The mechanism is based on experimental observations on sodium chloride over a range of temperature. It is proposed that the main factor responsible for extending a surface microcrack is the local plastic constraint that it exerts. The magnitude of the constraint in a single crystal depends upon the orientation of the surface with respect to the Burgers vector. Microcracks extend anisotropically to form slits along channels between slip bands. This is because slip bands resist crack propagation across them but enhance propagation parallel to them. Raising the temperature from liquid nitrogen to 150 C promotes a change from straight to wavy glide. Wavy glide relaxes the plastic constraint at the surface whereas straight glide cannot. It is shown that the change in slip mode accounts for the brittle to ductile transition in sodium chloride. (Author)

AD-285 259 Div. 25, 30
(TISTP/MS) OTS price $8.60

Laboratory for Electronics, Inc., Boston, Mass.
RESEARCH IN FERROMAGNETICS.
Annual rept. 1 Sep 60-31 Aug 61, 31 Aug 61, 1v. incl. illus. tables, refs.
(Rept. no. 570-A3)
(Contract Nonr-267600, Proj. NR 048-137)
Unclassified report

DESCRIPTORS: *Ferromagnetic materials, *Memory devices, Ferromagnetism, Thin films, Thickness, Measurement, Instrumentation, Hysteresis, Magnetic tape.

Film geometry is related to wall motion, and it is shown that, for large films, the direction of the background magnetization affects this motion. In some cases it is found that a small transverse field increases the uniformity of motion. It was found that 750 domains could be recorded per inch of film. A description of another group of experiments performed to study anisotropy dispersion is also included. In the discussions of controlled domain-wall motion, nucleation and propagation of extraneous walls is indicated. The origin of these walls is investigated through a study of the magnetization distributions which can be expected in films. Four types of magnetization distributions at edges are considered: an Abrupt Edge configuration; a Tapered Edge configuration; a Curling configuration; and the Closure Domain configuration. A theoretical treatment of these configurations is given. Experimental results which support the theory are presented. Special projects required in the study of domain-wall-motion devices are described. Current sources for the tapered conductor are treated. Several improvements in the hysteresis-curve tracer, are discussed, as well as the adaptation of this curve tracer to Kerr-effect devices. An anomalous effect observed with an earlier curve tracer is also explained. (Author)

AD-285 272 Div. 25
(TISTM/ODN) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
LINE WIDTH MEASUREMENT ON SINGLE CRYSTAL YTTRIUM-IRON GARNET,
by A. D. Krall. 10 Aug 62, 14p. incl. illus. 7 refs. (Rept. no. NOLTR 62-44)
Unclassified report

DESCRIPTORS: *Single crystals, *Yttrium, *Iron, Ferromagnetism, Ferromagnetic materials, Microwave frequency, Theory, Wave analysis, Measurement.

A simple, quick measurement of narrow (about 1 oersted) line width ferromagnets by the use of re-radiated microwave fields is described. The equations of motion are combined with the electromagnetic field equations and then solved to show what is being measured and how the measurement should be made. Experimental equipment is described in detail. (Author)

Division 25 - PHYSICS

AD-285 289 Div. 25, 9
(TISTP/FR) OTS price $3.60

Parsons, C. A. and Co., Ltd. (Gt. Brit.).
ELECTRON-ION RECOMBINATION IN MAGNETOPLASMADYNAMIC POWER GENERATORS.
Research rept.,
by I. R. McNab and C. A. Robinson. Sep 62, 15p. incl. illus. tables (Rept. no. NRC 62-90)
(Contract N62558-3127)
Unclassified report

DESCRIPTORS: *Recombination reactions, Gas ionization, Electrons, Ions, Atoms, Magnetohydrodynamics, Generators, Plasma physics.

In inert gas-alkali metal vapour magnetoplasmadynamic (MPD) power generators employing an ionisation level above that corresponding to thermal ionisation at the static temperature of the plasma, recombination will be one of the main factors controlling the electrical conductivity of the gas. The present comprehensive review of recombination mechanisms indicates that, for the type of MPD generator mentioned, a three body electron-electron-ion recombination process will be of greatest importance. For the case where the gaseous component of the MPD generator is di- or poly-atomic, an alternative recombination mechanism is postulated (three body electron-atom-ion) and a recombination coefficient derived; values of this coefficient are given as functions of mean electron energy for hydrogen, nitrogen, oxygen and ammonia. (Author)

AD-285 291 Div. 25
(TISTP/WH) OTS price $1.10

Zaragoza U. (Spain).
QUANTUM MECHANICAL APPLICATIONS TO CLASSICAL PERTURBATION THEORY.
Technical rept.,
by L. M. Carrido. 30 July 62, 8p.
(Grant AF EOAR 61-33)
Unclassified report

DESCRIPTORS: *Quantum mechanics, *Perturbation theory, Spain.

Contents:
Approximate constancy of adiabatic invariants in quantum mechanics
Action principle for classical fields
Relativisitc particle equations
General perturbation theory in classical mechanics
Schwinger's action principle for classical mechanics
Adiabatic invariants of plasmas in non-uniform magnetic fields

AD-285 299 Div. 25
(TISTP/WH) OTS price $9.10

Microwave Lab., Stanford U., Calif.
THEORY OF RELAXATION PROCESSES IN FERROMAGNETIC INSULATORS.
Technical note,
by M. Sparks. July 62, 104p. incl. illus. tables, 61 refs. (Scientific rept. no. 1; ML rept. no. 932)
(Contracts AF 19(628)342, Proj. 4600 and AF 49(638)415, Proj. 47501)
(AFCRL 62-566) Unclassified report

DESCRIPTORS: *Ferromagnetism, *Relaxation time, *Nuclear magnetic dipole moments, Quantum mechanics, Nuclear spins, Silicates, Yttrium.

Contents:
Simplified description of ferromagnetic relaxation
Detailed treatment of magnons
Relaxation frequency calculations
Summary of relaxation processes in YIG
Summary of experimental results for YIG

AD-285 302 Div. 25, 15
(TISTP/TL) OTS price $1.10

Massachusetts Inst. of Tech., Cambridge.
INVESTIGATIONS IN GLOBAL ANALYSIS.
Final rept., 16 Sep 60-30 June 62,
by Irving E. Segal. 30 June 62, 6p.
(Contract AF 49(638)945)
Unclassified report

DESCRIPTORS: *Quantum mechanics, Mathematical analysis, Real variables, Special functions, Differential equations, Operators (Mathematics), Numerical analysis, Partial differential equations, Algebra, Mesons, Spin, Tensor analysis.

AD-285 303 Div. 25
(TISTP/JW) OTS price $7.60

Technische Hochschule, Braunschweig (Germany).
AN APPROXIMATE METHOD FOR CALCULATING THE COMPRESSIBLE LAMINAR BOUNDARY LAYER WITH CONTINUOUSLY DISTRIBUTED SUCTION,
by W. Pechau. 2 July 62, 73p. incl. illus. 37 refs. (Rept. no. 62/12a)
(Grant AF EOAR 61-45)
Unclassified report

DESCRIPTORS: *Compressible flow, *Laminar boundary layer, Velocity, Airfoils, Fluid flow, Boundary layer, Mach number, Heat transfer, Temperature.

An approximate method for calculating the compressible laminar boundary layer with suction was developed. The method is applicable to arbitrary distributions of potential velocity and suction velocity on adiabatic walls at a Prandtl number of unity. With zero pressure gradient, it also holds in the case of heat transfer at constant wall temperature. A comparison with known exact solutions is made, and extensive and systematic computations of the laminar compressible boundary layer with suction on aerfoil sections are performed. In the subsonic range the profile NACA 0010 and in the supersonic range a symmetric biconvex profile with a thickness ratio of 10% is taken at various Mach numbers and angles of incidence. A special study is made on the influence of the location and extent of the suction area on the position of the point of separation. It is shown that a given suction quantity is most efficient in delaying separation when located on the aft part of the profile. (Author)

AD-285 306 Div. 25, 8
(TISTE/CAM) OTS price $4.60

Shockley Transistor Corp., Mountain View, Calif.
FAILURE MECHANISMS IN SILICON SEMICONDUCTORS.
Quarterly status rept. no. 4, 1 Apr-30 June 62,
by Hans J. Queisser. 9 July 62, 42p. incl. illus. refs.
(Contract AF 30(602)2556, Proj. 5519)
(RADC TDR 62-405)
Unclassified report

DESCRIPTORS: *Semiconductors, *Silicon, *Diodes, *Transistors, Diffusion, Conductivity, Failure (Mechanics), Chemical impurities, Oxygen, Lattices, Voltage, Measurement, Electric currents, Temperature, Crystal structure, Reliability, Growth, Solid state physics, Crystals.

Grain boundary diffusion in silicon was studied. Conductivity measurements of diffused wedge-shaped structures along the boundary give information about the enhancement of the diffusion along the dislocations of the boundary. Investigations of secondary breakdown phenomena in silicon power transistors were started. It was shown that this failure mechanism is produced by a localization of the current with a drastic temperature increase. These 'hot spots' are observed with temperature - sensitive paint and potential probing techniques. The results are in agreement with the predictions of a two-dimensional theory on lateral thermal instabilities in semiconductor devices. (Author)

AD-285 327 Div. 25
(TISTP/TL) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
THE DYNAMICS OF THE ELASTIC BUCKLING OF CYLINDRICAL SHELLS,
by John C. Yao. 6 Apr 62, 18p. incl. illus. 9 refs. (Rept. no. TDR-930(2570-30)TN-2)
(Contract AF 04(647)930)
(DCAS TDR 62-92) Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Elasticity, *Buckling, Stresses, Simulation, Vibration, Numerical analysis, Integration, Equations, Motion, Partial differential equations.

The buckling behavior of a cylinder axially compressed in a rigid testing machine is studied. The motion of the load head is assumed to be slow and essentially uniform. To simulate some possible vibration of the testing machine, a small periodic term was added to the uniform component of the motion. Initial cylinder imperfections, which contribute substantially to the reduction of the buckling strength, were also considered. The present solution explains the familiar phenomenon of the rapid decrease in load and the accompanying vibration in the buckling process. The limited numerical results show that vibration of the machine head probably has no significant effect on the buckling characteristics. (Author)

AD-285 328 Div. 25, 2
(TISTP/TL) OTS price $3.60

Aerospace Information Div., Washington, D. C.
NUCLEAR EFFECTS ON THE PROPAGATION OF ELECTROMAGNETIC WAVES,
1 Oct 62, 30p. (AID rept. no. 62-155)
Unclassified report

DESCRIPTORS: *Nuclear explosions, *Electromagnetic waves, *Ionosphere, *Radio waves, Propagation, Magnetic fields, Plasma physics, Particles, Cosmic ray bursts, Magnetic storms, Upper atmosphere, Bibliography.

AD-285 336 Div. 25
(TISTP/TL) OTS price $4.60

Aerospace Information Div., Washington, D. C.
SOVIET INFRARED STELLAR SPECTROSCOPY. ANNOTATED BIBLIOGRAPHY OF THE PERIOD 1947-1962.
28 Sep 62, 46p. (AID rept. no. 62-153)
Unclassified report

DESCRIPTORS: *Infrared spectroscopy, *Photography, *Infrared scanning, *Image converter tubes, *Infrared photography, Photographic equipment, Spectrophotometers, Electronic equipment, Nebolae, Planetary atmosphere, Solar energy, Aurorae, Nightsky, USSR, Translation, Bibliography.

AD-285 362 Div. 25, 4
(TISTM/ODN) OTS price $4.60

General Dynamics/Fort Worth, Tex.
THERMODYNAMIC PROPERTIES OF METAL SULFIDES,
by E. L. Gray. 13 Oct 58, 44p. incl. illus. tables, 25 refs. (Rept. no. FGT-2020)
(Contract AF 33(657)7248, Proj. 16-05-501)
Unclassified report

DESCRIPTORS: *Metallic compounds, *Sulfides, *Thermodynamics, Electrodes, Hydrogen electrodes, Silver compounds, Heat of formation, Copper compounds, Platinum, Electrolytic cells, Chemical equilibrium, Theory, Chemical reactions, Solubility, Entropy, Test equipment.

An electrochemical method based on thermodynamic principles was used. The method consisted of the accurate measurement of the electromotive force of the following galvanic cells: Cu, Cu2S:H2, Pt and Cu, Cu2S:Ag2S, Ag. From this measured potential the standard electromotive force was calculated and from this standard electromotive force the standard free energy change of the cell reactions was determined. From these values and data from other sources for the free energy of formation of the sulfide ion, the cuprous ion, H2S gas and solid Ag2S the following thermodynamic constants of cuprous sulfides were calculated: 20.1 K cal/mole for free energy of formation 3.5 x 10 to the minus 48th power for the solubility product constant. (Author)

AD-285 381 Div. 25, 30
(TISTM/EJH) OTS price $9.10

Little, Arthur D., Inc., Cambridge, Mass.
METHODS FOR PRECISION TEMPERATURE CONTROL.
Final rept., 15 May 61-30 June 62,
by Theodore P. Heuchling, Igor A. Black, and Anne Everest. 30 June 62, 99p. incl. illus. tables, 8 refs.
(Contract DA 36-039-sc-87297)
Unclassified report

DESCRIPTORS: *Quartz crystals, *Crystal ovens, *Temperature control, *Thermal insulation, Miniature electronic equipment, Heat-resistant glass, Vacuum systems, Seals, Thermostats, Switching circuits, Silver, Coatings, Stainless steel.

It is possible to fabricate a miniature, partially silvered Pyrex dewar whose vacuum will not deteriorate appreciably for at least 6 months. Pyrex remains the best choice of material from which to make glass dewars. It is possible to make an oven with an accessible crystal whose insulation system has a heat loss of less than 300 milliwatts between -55 and +85 C. A partially silvered Pyrex outer dewar combined with our standard Pyrex inner dewar can improve the performance of the inner dewar by at least 100 milliwatts at the expense of about 2-1/4 in. increased volume. Using this insulation system in conjunction with a fully operational core, it is possible to make an oven accessible crystal which requires a total average input of less than 400 milliwatts to maintain the crystal at +85 C while ambient is at -55 C. It is possible to maintain the crystal temperature to within ± 0.10 C over the ambient temperature range of -55 to +80 C. (Author)

AD-285 384 Div. 25
(TISTP/MS) OTS price $3.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
THE WAKE OF A CHARGED PARTICLE MOVING THROUGH A

PLASMA WITH MAGNETIC FIELD,
by Saroj K. Majumdar. 14 Sep 62, 36p. incl. illus. 11 refs. (Technical rept. no. 401)
(Contract DA 36-039-sc-78108, Proj. 3-99-00-000)
Unclassified report

DESCRIPTORS: *Electrons, *Plasma physics, Magnetic fields, Electromagnetic waves, Motion.

The motion of a charged particle through a low-density electron plasma placed in an external constant magnetic field has been investigated by using transport equations. The motion of the particle in the direction of the applied magnetic field is considered in detail; the particles moving at right angles to the magnetic field are considered briefly. The charge density developed in the medium as a result of interaction of the medium with the moving particle through long-range Coulomb force is evaluated for the wavelength, Lambda, which is such that R is greater than Lambda is greater than Lambda (D), where R is the distance from the moving particle, and Lambda (D), the Debye wavelength. Three types of charge-density waves are associated with the moving test particle. One is a 'plasma electron' wave that exists only for velocities of the test particle that are greater than the average thermal speed of the plasma electron; this wave also shows a Mach cone distribution. The second is an elliptically shaped 'extraordinary' electromagnetic wave that exists for all velocities of the test particle, and is coupled to the plasma electron wave. The third is an almost spherical weak wave associated with the ordinary electromagnetic wave. This third wave is not coupled to the other two waves within the range of approximation considered here, and it goes over to an exponentially decreasing charge distribution in the limit of very small magnetic field. (Author)

AD-285 388 Div. 25
(TISTP/TL) OTS price $6.60

Norweigian Defence Research Establishment.
A DELTA-FUNCTION ANALYSIS OF TRANSVERSE WAVE INTERACTION IN PERIODIC STATIC FIELDS,
by Kjell Blotekjaer and Bjarne Malsnes.
10 June 62, 46p. illus. 6 refs. (Technical note no. 8)
(Contract AF 61(052)531)
(RADC TDR 62-452) Unclassified report

DESCRIPTORS: *Functional analysis, *Electron beams, Electric fields, Magnetic fields, Numerical analysis, Matrix algebra, Statics, Vector analysis, Tranformation (Mathematics), Quadrupole moments, Microwaves, Special functions, Rotation, Differential equations.

The interaction between transverse electron beam waves in periodic fields is usually analyzed by assuming a sinusoidal variation of the electric and magnetic fields. In this analysis another approach is used, assuming the fields to consist of functions. Exact solutions can then be obtained by standard mathematical methods. The interaction in quadrupole fields, two-dimensional fields, and fields of rotational symmetry is considered, and the results are shown to agree well with the sinusoidal-field theory. Extensive numerical calculations are presented. (Author)

AD-285 389 Div. 25
(TISTM/ODN) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
HIGH-POWER FERRIMAGNETIC RESONANCE AT X-BAND IN INDIUM-, GALLIUM-, AND CHROMIUM SUBSTITUTED YTTRIUM IRON GARNETS,
by G. E. McDuffie, Jr. and L. J. Schwee.
12 July 62, 11p. incl. illus. table, 13 refs.
(Rept. no. NOLTR 62-121)
Unclassified report

DESCRIPTORS: *Garnets, *Resonance absorption, *Ferromagnetism, *Crystals, *Oxides, Yttrium compounds, Indium compounds, Iron compounds, Gallium compounds, Chromium compounds, X band, Materials, Magnetic properties.

High-power ferrimagnetic-resonance experiments were performed at 9040 Mc/sec on polycrystalline garnet materials of the general form $3Y_2O_3$-xM_2O_3.$(5-x)Fe_2O_3$, where M represents the replacement of Fe by nonmagnetic ions. Ga- and In-substituted materials were investigated for values of x between 0 and 1.0 to study the effects of these substitutions on the onset of nonlinearity. Measurements were made of the decline of the susceptibility for spherical samples in a linearly polarized rf field using rf amplitudes up to 40 oe. These measurements were made on the same samples for which low-power linewidths have been reported. For relatively pure YIG, the spin-wave linewidth delta H sub K was 3.8 oe and independent of the uniform precessional linewidth. In the substituted materials, the effects of the substitutions on the onset of nonlinearity were similar to those reported by other investigators. Data on Cr substitutions are also reported, as well as a discussion of inhomogeneity broadening in these materials. (Author)

AD-285 395 Div. 25
(TISTP/TL) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
RADIO-FREQUENCY PROBES FOR IONIZED WAKE STUDIES,
by T. Marshall, L. L. Hill and B. J. Crapo.
20 June 62, 18p. incl. illus. 7 refs. (Rept. no. NOLTR 62-64; Ballistics research rept. no. 62)
Unclassified report

DESCRIPTORS: *Wake, *Gas ionization, Radiofrequency, *Electrical conductance, *Measurement, Ferrites, Coils, Shock tubes, Calibration, Magnetic fields, High frequency, Interferometers, Electrons, Density, Phase shifters, Circuits.

A probe technique for measuring the electrical conductivity in a small region of an ionized flow field is described. The technique involves the observation of the interaction between an ionized gas and a perturbing R.F. magnetic field of low strength. The probes are basically small coils mounted on ferrite supports and are presently undergoing dynamic calibration in a shocktube specially designed for that purpose. The shocktube is instrumented with a 70 KMC microwave interferometer which yields direct electron density information as a comparison parameter. (Author)

AD-285 405 Div. 25
(TISTP/EJH) OTS price $1.10

Oklahoma State U. Research Foundation, Stillwater.
ATOMIC COLLISIONS.
Final technical rept.,
by Benjamin Roth. Aug 62, 2p.
(Grant nos. AF-AFOSR-62-102 and AF-AFOSR-31-63)
Unclassified report

DESCRIPTORS: *Quantum mechanics, *Hydrogen, *Atoms, *Electron capture, Electrons, Ions, Nuclear reactions, Nuclear magnetic resonance, Theory, Electron capture.

The problem of electron exchange in $H^+ - H$ collisions was first investigated on a purely quantum mechanical basis. A calculation was made

using the method of distorted waves. The two scattered waves, the one for non-capture and the other for capture (the electron being in the ground state in both cases), are coupled by the nucleus-electron interaction. Interference between these two waves gives rise to resonances. Calculation gives, for the energies of these resonances, values which agree exactly with four experimentally determined resonances in the range 0.5 to 50 kev. The resonances do not reach their maximum values (a probability of 1 or 0 for capture) as there is some damping. The interaction which gives rise to the resonance is a complex quantity. (Author)

AD-285 426 Div. 25
(TISTP/ODN) OTS price $1.10

Sloane Physics Lab., Yale U., New Haven, Conn.
OPTICAL ABSORPTION EDGE OF INSULATING CRYSTALS AT LOW TEMPERATURES.
Final rept., 1 Mar 59-31 Aug 62,
by Robert G. Wheeler. 31 Aug 62, 5p.
(Contract AF 49(638)503)
Unclassified report

DESCRIPTORS: *Optics, *Crystals, *Insulating materials, Bibliography, Semiconductors, Zinc compounds, Cadmium compounds, Mercury compounds, Magnesium compounds, Tellurides, Low temperature research, Sulfides, Selenides.

AD-285 430 Div. 25
(TISTP/TL) OTS price $2.60

Naples U. (Italy).
THE RENORMALIZATION GROUP,
by E. R. Caianiello. Aug 62, 25p. incl. illus. 13 refs. (Technical note no. 8)
(Contract AF 61(052)434)
Unclassified report

DESCRIPTORS: *Groups (Mathematics), *Transformations (Mathematics), *Quantum mechanics, Perturbation theory, Functional analysis, Differential equations, Green's function, Integral equations, Determinants, Matrix algebra.

AD-285 433 Div. 25
(TISTP/FR) OTS price $1.10

Office of Technical Services, Washington, D. C.
BIOGRAPHIC INFORMATION ON LAJOS JANOSSY-HUNGARY.
3 Oct 62, 3p. (Rept. no. JPRS 15550; Trans. from Fizikai Szemle 12:5, pp. 159-160, Budapest, 1962)
Unclassified report

DESCRIPTORS: *Scientific personnel, Cosmic rays, Relativity theory, Quantum mechanics.

AD-285 456 Div. 25
(TISTM/ODN) OTS price $8.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 8. SOLID STATE RESEARCH.
21 Sep 62, 70p. incl. illus. tables, refs. (Rept. no. 2)
(Contract AF 19(628)500)
(AFESD TDR 6 -134) Unclassified report

DESCRIPTORS: *Solid state physics, *Transistors, *Materials, Diodes, Alloys, Gallium alloys, Arsenides, Semiconductors, Analysis, Oxides, Praseodymium compounds, Tin compounds, Germanium, Electrical properties, Tellurides, Silicon, Crystals, Coatings, Tin, Niobium, Wire, High pressure research, Solids, Magnetic properties, Optics, Infrared optical systems, Metallic compounds, Superconductors, Laboratory equipment, Thermodynamics, Physical properties.

Contents:
Solid state device design
Chemistry
Thermodynamics of semiconductors
Properties of PrOX and SnO2
Materials research
Stoichiometry and electrical properties of SnTe
High pressure research
Band structure of solids
Microwave and magnetic properties of solids
Transition metal compounds
Film physics
UHF transistor development
Optics and infrared

AD-285 463 Div. 25, 17
(TISTP/TL) OTS price $2.60

Hebrew U. (Israel).
A METHOD FOR DETERMINATION OF THE OPTICAL CONSTANTS OF THIN ABSORBING LAYERS,
by J. Harris and H. Weinberger. 1 Jan 62, 27p. incl. illus. tables, 14 refs. (Technical scientific note no. 2)
(Contract AF 61(052)279)
(AFCRL 62-861) Unclassified report

DESCRIPTORS: *Metal films, *Optics, *Refractive index, Absorption, Nickel compounds, Measurement.

Tables are presented which enable the optical constants of a thin absorbing layer on an absorbing base to be determined from measurements of the light reflected by this system. The mthod was applied to layers of 'nickel-black' on silver substrates.

AD-285 476 Div. 25
(TISTM/ODN) OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
CRYOPUMPING IN THE NEAR FREE-MOLECULE FLOW REGION,
by E. S. J. Wang, J. A. Collins, Jr., and J. D. Haygood. Oct 62, 23p. incl. illus. tables, 7 refs. (Rept. no. AEDC TDR 62-164)
(Contract AF 40(600)1000, Proj. 8951)
Unclassified report

Presented at the 1962 Cryogenic Engineering Conference, 14-16 Aug 1962, at University of California, Los Angeles.

DESCRIPTORS: *Carbon dioxide, *Cryogenics, Superaerodynamics, Low temperature research, Liquefied gases, Nitrogen, Pressure, Analysis, Tests, Theory, Vacuum apparatus.

Results are presented of an experimental study on the cryopumping of CO2 at liquid N2 temperature at pressures where the mean free path is comparable to the cryosurface dimensions. In this range, it is shown that the pumping speed is no longer constant as it is in the low pressure ranges (free-molecule flow), but increases with increasing pressure through what is termed the transition region and approaches a constant value in the higher pressure ranges (continuum flow). The pumping speed in the continuum region is shown to be as much as three times that in the free-molecule region. Theoretical analyses of experimental results are presented, including an explanation of the threefold increase in pumping speed. (Author)

Division 25 - PHYSICS

AD-285 510 Div. 25, 30, 32
(TISTM/EJH) OTS price $10.50

Pennsylvania State U. Coll. of Chemistry and Physics, University Park.
RESEARCH IN MODERN CRYSTALLOGRAPHY.
Final rept., 1 Apr 58-28 Feb 62,
by R. Pepinsky. Mar 62, 133p. incl. illus. tables.
(Contract AF 49(638)416)
Unclassified report

DESCRIPTORS: *Crystals, *Documentation, *Data processing systems, *Data storage systems, Data, Punched card methods.

Contents:
Abandonment of small-scale punched-card machine retrieval techniques
New input-output system for the Groth Institute
Some cost estimates for the IBM 1401 usage
Program for new grant period
Problems of data extraction, processing and editing
Necessity for activation of outside extracting collaboration
Appendix A: Crystallographic data extraction at the source
Appendix B: Progress report from Groth Institute, June 1961
Appendix C: Examples of Groth Institute data extracting forms and peek-a-boo cards
Appendix D: On paper-tape vs. punch-card equipment

AD-285 512 Div. 25
(TISTM/EJH) OTS price $22.25

Pennsylvania State U., University Park.
STUDIES IN CRYSTAL PREPARATION AND STRUCTURAL MECHANISMS FOR NEW PHYSICAL PROPERTIES OF SOLIDS.
Final rept.,
by R. Pepinsky. Mar 62, 425p. incl. illus. tables.
(Contract AF 49(638)1044; Continuation of Contract AF 18(603)35)
Unclassified report

DESCRIPTORS: *Ferroelectric crystals, *Ferroelectricity, *Ferroelectric materials, Antiferroelectricity, Crystals, Single crystals, Crystal structure, Electrical conductance, Photoconductivity, Dielectrics, Optics, Acoustics, Polarization, Resonance, Photoconductivity, Phase transitions, Complex compounds, Salts, Tartrates, Sulfates, Organic compounds, X-ray diffraction analysis, Laboratory equipment, Solid state physics.

Ferroelectric mechanism studies were concerned with the optical rotatory power phenomenon and other physical behaviors. Structural studies were made of highly-optical-absorbing organic crystals of the electron-donor electron-acceptor class, to determine whether some crystal-structural basis could be established for their electrical conductivity. The crystal structures of chloranil-pyrene and coronene-I2 were determined work on photoconductivity of these compounds was initiated. The possibility of molecular orientation of the imprisoned molecules in clathrate structures led to an examination of the dielectric behavior of certain clathrates. It was found that (quinol)3.MeOH shows a large dielectric peak in the neighborhood of 60 K. Order-disorder phenomena in ferroelectrics and antiferroelectrics were examined by the use of diffuse x-ray scattering. Interesting results were obtained for (glycine)3.H2SO4 and NaNO2. (Author)

AD-285 539 Div. 25
(TISTP/TL) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
DYNAMIC STABILITY OF CYLINDRICAL SHELLS UNDER STATIC AND PERIODIC AXIAL AND RADIAL LOADS,
by John C. Yao. 27 July 62, 30p. incl. illus. 14 refs. (Rept. no. TDR-169(3560-30)TR-1)
(Contract AF 04(695)169)
(DCAS TDR 62-151) Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Mechanics, *Load distribution, Buckling, Deformation, Stresses, Loading, Pressure, Stability, Frequency, Oscillations, Vibration, Damping, Shear stresses, Equations, Motion, Numerical analysis.

Several cases of the dynamic stability problem for cylinders are solved explicitly. Combinations of the static and periodic radial and axial loads are considered. The regions of instability and stability are established directly in terms of the geometry of the cylinder, load intensity, and frequency. All the numerical results obtained here tend to indicate that a cylinder designed according to the static buckling load can withstand an additional periodic load. It was found that the ratio of additional periodic load to the static buckling load was greater for a thin cylinder than for a thicker cylinder of the same radius. It was also found that the resistance of a cylinder to loads in excess of the static buckling load increases with increasing frequency of loading. (Author)

AD-285 553 Div. 25
(TISTM/ODN) OTS price $1.10

Carnegie Inst. of Tech., Pittsburgh, Pa.
THE HEAT CAPACITY OF Cu(HCO2)2.4H2O BETWEEN 10 DEGREES AND 100 K,
by J. Skalyo and S. A. Friedberg. 11 Sep 62, 4p. incl. illus. 4 refs. (Technical rept. no. 13)
(Contract Nonr-76005, Proj. NR 018-301)
Unclassified report

DESCRIPTORS: *Copper compounds, *Formates, *Specific heat, *Hydrates, Calorimeters, Low temperature research, Entropy, Magnetic susceptibility.

The heat capacity of Cu(HCO2)2.4H2O was measured between 10 and 100 K in a vacuum calorimeter. No pronounced anomalous peaks are observed near 16.8 K or 62 K, temperatures at which susceptibility maxima appear. A consistent explanation of these facts is provided by the assumption that most of the spin entropy is lost by short-range ordering on cooling through a wide temperature region around 62 K so that the lower transition, while abrupt, is accompanied by a very small entropy change. (Author)

AD-285 563 Div. 25, 14
(TISTM/TCG) OTS price $4.60

Carborundum Co., Niagara Falls, N. Y.
MECHANICAL PROPERTIES OF SILICON CARBIDE SINGLE CRYSTALS.
Final rept., 12 May 61-12 Aug 62,
by H. D. Batha and D. P. H. Hasselman. Sep 62, 37p. incl. illus. tables, 14 refs.
(Contract NOw-61-0676-c)
Unclassified report

DESCRIPTORS: *Silicon compounds, *Carbides, *Single crystals, Ceramic materials, Growth, Vaporization, Elasticity, Fracture (Mechanics), Deformation, Plasticity, Pickling, Shear stresses, Magnesium compounds, Oxides, Ultrasonics, Mechanical properties.

Research was conducted to investigate the mechanical properties of vapor phase grown single crystals of silicon carbide. Equipment was designed to deform the crystals in bending by three-point loading. Preliminary results for Young's modulus of elasticity and crossbending strength are reported. Values of strength as high as one million psi were obtained. A correlation was found between sample thickness and strength. The strength at 1750 C considerably exceeds the strength at room temperature. No evidence of gross plastic deformation under mechanical load was found as high as 1800 C. Some observations were made of dislocation motion during etching at 900 C in borax. (Author)

26. PRODUCTION AND MANAGEMENT

AD-284 511 Div. 26, 15
(TISTP/WH) OTS price $1.60

Columbia U. School of Engineering, New York.
ON ASSEMBLY LINE BALANCING,
by Morton Klein. 31 Aug 62, 12p. incl. illus. 5 refs. (Technical rept. no. 17)
(Contract Nonr-26655)
Unclassified report

DESCRIPTORS: *Linear programming, *Manufacturing methods, *Scheduling, *Industrial production.

AD-284 624 Div. 26, 14, 17
(TISTM/MS) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
LINER FOR EXTRUSION BILLET CONTAINERS.
Interim technical documentary progress rept., 5 June-5 Sep 62,
by S. A. Spachner. 5 Sep 62, 1v. incl. illus.
(Contract AF 33(657)8784, Proj. 7-945)
(ASD TR 7-945, pt. 1) Unclassified report

DESCRIPTORS: *Containers, *Cylinder liners, *Extrusion, *Ceramic materials, *Ceramic coatings, Flame spraying, Manufacturing methods, Processing, Mechanical properties, Dioxides, Zirconium compounds, Carbides, Aluminum compounds, Oxides, Nickel, Design, Steel.

A container-sleeve-liner assembly was designed which will provide adequate support for ceramic, ceramic coated metal, or metal liners. The design minimizes mechanical property requirements of liner materials, and permits rapid removal of worn or damaged liners. A high-strength stem was designed and fabricated. Technical literature on high-strength materials was reviewed, and high-strength materials producers were contacted to locate sources and assess applicability of existing materials for refractory metal extrusion liner use. (Author)

AD-284 664 Div. 26, 15
(TISTP/GRW) OTS price $4.60

Lees Instrument Research, Inc., Cambridge, Mass.
UNCERTAINTY CONCEPTS FOR APPLICATION IN SYSTEMS ANALYSIS,
Final rept.,
by Sidney Lees. May 62, 37p. incl. illus. 12 refs.
(Contract AF 49(638)1111)
(AFOSR-2856) Unclassified report

DESCRIPTORS: *Measure theory, *Operations research, Probability.

Uncertainty of measurements examined by Shannon's theorem and Jaynes' formalism leads to definition of imprecision as bounds enclosing the measured value. Width of bounds is related to sytem performance and possible malfunction.

AD-284 667 Div. 26, 15
(TISTP/WH) OTS price $1.10

Carnegie Inst. of Tech., Pittsburgh, Pa.
A NOTE ON THE COBB-DOUGLAS FUNCTION,
by Herbert A. Simon and Ferdinand K. Levy.
25 July 62, 3p. 8 refs. (ONR research memo. no. 100)
Unclassified report

DESCRIPTORS: *Operations research, *Special functions, *Partial differential equations, *Industrial production, *Labor, Functional analysis.

AD-284 668 Div. 26, 15
(TISTP/WH) OTS price $2.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
A LINEAR PROGRAMMING MODEL FOR BUDGETING AND FINANCIAL PLANNING,
by Y. Ijiri, F. K. Levy, and R. C. Lyon. July 62, 24p. incl. tables, 7 refs. (ONR research memo. no. 94)
(Contract Nonr-76001, Proj. NR-047011)
Unclassified report

DESCRIPTORS: *Linear programming, *Money, *Economics.

AD-284 768 Div. 26, 17
(TISTM/AW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
ELECTROSPARK MACHINING OF GAS TURBINE IMPELLERS,
by A. B. Sosenko. 7 Sep 62, 4p. 3 refs. (AID rept. no. 62-130; Trans. from Electrospark Machining of Gas Turbine Rotors. Stanki i Instrument, no. 6, pp. 16-20, June 1962)
Unclassified report

DESCRIPTORS: *Spark machining, *Gas turbine rotors, Heat resistant alloys, Steel, Stainless steel, Impellers, Turbine blades, Surfaces, Effectiveness, Manufacturing methods.

The possibility of manufacturing radial vaned impellers for small gas turbines and turbocompressors by electrospark machining is discussed. The relationships among main characteristics of the electrospark machining process for three heat-resistant alloys are the same as those for carbon steels. The relationships are (1) dependence of optimum current on area being machined, (2) dependence of optimum current on metal-removal rate, and (3) dependence of surface finish on optimum current. The efficiency of the new method is high. Machining of an impeller 300 mm in diameter on a type-473 machine requires only 10% of the time required for milling. The uniform allowance left for grinding reduces grinding time by one-half. Electrospark machining expands the potential of gas turbine design and improves the technical and economic characteristics of gas turbines. The method can be improved by machining several channels simultaneously, and can be used for machining other complex-shape parts. (Author)

AD-284 900 Div. 26
(TISTB/AW) OTS price $4.60

Carnegie Inst. of Tech., Graduate School of Industrial Administration, Pittsburgh, Pa.
EFFECTS OF AUDITING RECORDS: INDIVIDUAL TASK ACCOMPLISHMENT AND ORGANIZATION OBJECTIVES,
by N. C.Churchill and W. W. Cooper. 1962,
39p. incl. illus. table, 15 refs. (ONR research memo. no. 98)
(Contract Nonr-76001, Proj. NR-047011)
Unclassified report

Presented at the O.N.R. sponsored Conference on Research in Organizations, Pittsburgh, Pennsylvania, Carnegie Institute of Technology, June 22, 23, 24, 1962.

DESCRIPTORS: *Industrial psychology, *Management engineering, Quality control, Control, Behavior, Test methods.

Certain managerial concepts related to auditing, and some of the effects that might be expected of an audit, were examined. Managerial and accounting types of audit were included in order to investigate properties of the corresponding basic audit processes when used as instruments

for managerial control relative to (1) specific task performance and (2) over-all organizational requirements. Since the term 'auditing' is broad the area of accounting audits was chosen for an initial study emphasis. This area was also circumscribed further in a variety of ways. For example, aspects such as the types of recommendations that might result from an actual audit were not included in this study. Attention was focussed rather on the basic audit itself--referred to as the audit per se. The study was the first of a series of investigations into the audit process and the use of auditing as an instrument of managerial control. (Author)

AD-284 901 Div. 26, 15
(TISTP/WH) OTS price $9.10

Case Inst. of Tech., Cleveland, Ohio.
A CLASS OF OPTIMAL INVENTORY DECISION RULES,
by Bani P. Banerjee. June 62, 104p. incl. illus. tables, 139 refs.
(Contract Nonr-114111)
Unclassified report

DESCRIPTORS: *Operations research, *Scheduling, *Commerce, *Linear programming, *Control system, Matrix algebra, Feedback.

Contents:
A model of single-item inventory with continuous production and inspection
Single-item inventory with delivery lags
Multi-item inventory management
A generalized model for multi-item inventory
A model of single-item inventory with continuous production and inspection
Single-item inventory with delivery lags
Multi-item inventory management
A generalized model for multi-item inventory

AD-285 021 Div. 26
(TISTP/WH) OTS price $2.60

Air Force Cambridge Research Lab., Bedford, Mass.
DESIGN FOR A FAILURE,
by W. B. Bishop. Aug 62, 21p. incl. illus. 10 refs. (Rept. no. AFCRL 62-578)
(Proj. 4608)
Unclassified report

DESCRIPTORS: *Electronic equipment, *Reliability, *Statistical analysis, *Probability.

This analysis concludes that there is a distinct need for specifying when it is acceptable for a piece of equipment to fail. Although there is a close relationship between specifying when parts may fail and specifying when they should not fail, there is an important difference. Designing for a specific time of failure tends to increase efficiency and does not necessarily reduce reliability. Also, more information about actual failure mechanisms is required to achieve failure reasonably close to a specified time. (Author)

AD-285 164 Div. 26, 17
(TISTM/ODN) OTS price $1.60

Linde Co., Div. of Union Carbide Corp., New York.
RESEARCH AND DEVELOPMENT WORK ON ELECTROLYTIC NIOBIUM AND NIOBIUM ALLOY CAPACITORS OF WET AND SOLID TYPES.
Quarterly progress rept. no. 1, 1 July-30 Sep 62, by F. E. Cariou. Oct 62, 16p. incl. illus. tables.
(Contract NObsr-87478)
Unclassified report

DESCRIPTORS: *Niobium, *Niobium alloys, *Capacitors, Impurities, Tantalum alloys, Alloys, Powder alloys, Carbon, Single crystals (Metallurgy), Powder metals, Anodes, Processing, Manufacturing methods, Foils.

A status report is presented showing progress achieved in the following areas: Impurity trace analysis of different Nb materials; preparation of pure Nb foil and Nb, Ta single crystals; Preparation of Nb-Ta alloy powders; optimum conditions for removal of C from Nb; optimum anodization conditions for pure Nb anodes; preparation of Nb alloy foil and alloy single crystals; optimum processing conditions for solid Nb plug capacitors; and preparation of highly purified Nb powders, including microspheres. Studies have been initiated in each area but none have been completed to date.

AD-285 215 Div. 26, 17
(TISTM/EJH) OTS price $1.75

Illinois U. Engineering Experiment Station, Urbana.
THE EFFECT OF FLANK WEAR ON TOOL TEMPERATURES AND TOOL FORCES IN THE MACHINING OF HEAT TREATED STEEL.
Technical rept. no. 10, June 61-Jan 62 on Research on Tool Flank Wear,
by B. T. Chao, D. R. Jeng, and K. J. Trigger.
Aug 62, 60p. incl. illus. tables, 16 refs.
(ME technical rept. no. ORD-1980-10)
(Contract DA 11-022-ORD-1980, Proj. 5B99-01-004)
(AROD rept. no. 1492:12)
Unclassified report

DESCRIPTORS: *Cutting tools, *Machine tools, *Carbide tools, *Steel, Friction, Temperature, Stresses, Heat, Machining, Test methods, Test equipment, Infrared detectors.

An extensive investigation is made on the influence of flank rubbing on tool-work and tool-chip interface temperatures for the machining of a quenched and tempered alloy steel. Local flank temperatures are measured by a photoconductive, infra-red radiation detector. Temperature distribution and rate of energy dissipation at both interfaces are computed therefrom using a geometric electric analog. The foregoing results, together with tool force dynamometer data, makes it possible to examine changes in frictional behavior at both interfaces as wear develops. It is concluded that the wide difference in the rigidity of the tool-work and tool-chip pair plays an important role in the wear mechanism. (Author)

AD-285 337 Div. 26, 17, 27
(TISTM/EJH) OTS price $1.10

Aerospace Information Div., Washington, D. C.
ELECTROSPARK MACHINING OF COMPLEX-SHAPE PARTS.
18 Sep 62, 2p. (AID rept. no. 62-124; Trans. from Electrospark Metal Machining at the Kaluga Turbine Plant. Byulleten' Tekhniko-ekonomicheskoy Informatsii, no. 6, 21-24, 1962)
Unclassified report

DESCRIPTORS: *Steel, *Stainless steel, *Spark machining, Impellers, Dies, Gas turbine blades, Machining, Electrodes, Graphite, Copper electrodes, Tungsten, Precision finishing, USSR, Transfation.

The Kaluga Turbine Plant makes extensive use of electrospark machining in the manufacture of dies and gas turbine blades made from EI-612K steel and turbine impellers made from EI-661 steel. Dimensional precision of 0.2 mm and Class 3 surface finish (roughness height, 40 to 63

microns) are achieved. Numerous experiments in the machining of EI-612K, EI-661 and 5XHT steels and steel 45 showed that graphite electrodes possess minimum relative wear (3 to 5%) and maximum life, output, and precision. Good results were also obtained with copper electrodes (15 to 23% wear), which are used for piercing narrow slots and cutting off and cutting out blanks from heat-resistant alloys. These copper electrodes permit machining at higher power levels and metal-removal rates. For piercing small deep holes, tungsten electrodes proved to be the best. Their relative wear is 1 to 2%. (Author)

AD-285 372 Div. 26, 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - CHOBERT 3/32 HOLLOW STEEL RIVETS - GALVANIC CORROSION EFFECTS WITH 7075 ALUMINUM - INVESTIGATION OF,
by J. L. Cozart. 30 Jan 59, 9p. incl. illus. tables (Rept. no. FTDM-2154)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Rivets, *Steel, *Aluminum alloys, Bolts, Torque, Alloys, Surfaces, Sprays, Sodium compounds, Chlorides, Solutions, Tests, Titanium alloys, Corrosion.

Significant corrosion did not occur in or near Chobert (cadmium plated steel) rivets when joined to FXW020 nutplates 7075-T6 aluminum alloy and exposed to 200 hour salt spray. The use of wash prime on Chobert rivets is not considered necessary in this application. (Author)

27. PROPULSION SYSTEMS

AD-284 523 Div. 27, 14
(TISTA/JEB) OTS price $1.60

Raytheon Co., Waltham, Mass.
HIGH TEMPERATURE MATERIALS DEVELOPMENT.
Final rept., 10 Nov 60-15 Nov 61 on Nozzles and Reliability.
15 Nov 61, 12p. incl. illus. table, 4 refs.
(Rept. no. S-460)
(Contract NOw 61-0155-c; Continuation of Contract NOrd-19135)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, Manufacturing methods, Microstructure, Refractory materials, Casting, Refractory coating, Graphite.

Six second-stage Pyrographite nozzle inserts and two first-stage inserts probably are being designed and fabricated. (Author)

AD-284 578 Div. 27, 14
(TISTM/ODN) OTS price $1.60

Atlantic Research Corp., Alexandria, Va.
IMPROVEMENT OF THE USEFULNESS OF PYROLYTIC GRAPHITE IN ROCKET MOTOR APPLICATIONS.
Quarterly progress rept. 1 June-1 Sep 62,
by James D. Batchelor. Sep 62, 16p. incl. illus. tables.
(Contract DA 36-034-ORD-3279, Proj. TB4-004)
Unclassified report

DESCRIPTORS: *Graphite, *Rocket motor nozzles, Acetylenes, Ethylenes, Methanes, Microstructure, Deposits, Solid rocket propellants, Processing, High temperature research, Temperature, Thickness, Surface temperatures, Combustion, Erosion, Gases, Manufacturing methods, Tests, Design, Materials, Coatings.

Laboratory deposition studies were extended to improve the quality of pyrolytic graphite coatings produced at lower substrate temperatures. The substitution of ethylene or acetylene for methane as the carbon source gas did not provide improvement in coatings at 2000 C. At lower deposition temperatures a marginal improvement was noted. The most significant method of improving the microstructure of lower temperature coatings appears to be to use a resin precoat treatment of the substrate. Nozzle preparation and motor firing tests continued. Nine nozzles were fired with 6000 and 6500 F propellants to define the effect of the motor operating conditions on nozzle erosion rate. Excellent serviceability was found. Increased erosion rate at increased motor pressure was noted for the 6000 F propellant. Temperature measurements, made within the nozzle during 4 motor tests, show the effect of coating thickness and propellant flame temperature on the rate of heating of the nozzle. The presence of a low thermal conductivity coating such as pyrolytic graphite impedes heat flow into the nozzle but produces an extremely rapid rise in the surface temperature. (Author)

AD-284 829 Div. 27, 17, 26
(TISTM/REB) OTS price $1.00

Defense Metals Information Center, Columbus, Ohio.
NEW DEVELOPMENTS IN WELDED FABRICATION OF LARGE SOLID-FUEL ROCKET-MOTOR CASES,
by M. D. Randall, R. E. Monroe and D. C. Martin.
6 Aug 62, 26p. incl. illus. tables, 17 refs.
(DMIC rept. no. 173)
(Contract AF 33(616)7747, Proj. 2(8-8975)
Unclassified report

DESCRIPTORS: *Rocket cases, *Welding, Solid rocket propellants, Materials, Steel, Stainless steel, Titanium alloys, Manufacturing methods.

The predominant welding processes used in fabricating motor cases are inert-gas-shielded welding and resistance-seam welding. Three significant conclusions have been drawn relating to welded fabrication of motor cases: (1) Welding is not currently a limiting factor on the strength levels obtainable in production cases. These cases are being made of high-strength steels heat treated to strength levels between 190,000 and 210,000 uniaxial yield strength. (2) Welding could be used in motor cases in the near future at the following uniaxial-yield-strength levels: 170,000 psi - Ti alloys; 240,000- 250,000 psi - low-alloy and hot-work die steels; and 280,000-300,000 psi - Coldworked stainless steel or Mar-Aging steels. (3) Welding may be used in motor cases in 2 to 4 years at the following uniaxial-yield-strength levels: 200,000 psi - Titanium alloys; 260,000- 300,000 psi - Low-alloy and hot-work die steels; and 340,000 psi - Coldworked stainless steel or Mar-Aging steels. (Author)

AD-284 921 Div. 27
(TISTA/SEB) OTS price $11.50

Jet Propulsion Center, Purdue U., Lafayette, Ind.
EFFECTS OF SELECTED GAS STREAM PARAMETERS AND COOLANT PHYSICAL PROPERTIES ON FILM COOLING OF

ROCKET MOTORS,
by D. L. Emmons. Aug 62, 138p. incl. illus. tables, 43 refs. (Rept. no. TM-62-5; JPC-316)
(Contract Nonr-110021)
Unclassified report

DESCRIPTORS: *Film cooling, *Rocket motor nozzles, Water, Ammonia, Ethanol, Methanes, Physical properties, Coolants, Fluorides, Chlorides, Temperature, Pressure, Theory, Heat transfer, Gas flow, Equations, Vapors, Convection, Cooling.

The effects were studied of changes in the temperature, pressure, and Reynolds number of a hot gas stream upon the required flow rates of a single liquid (water) used for film cooling different lengths of a cylindrical test section. The effects were also studied of the physical properties of water, anhydrous ammonia, ethanol, and Freon-113 on the required film coolant flow rates for a single condition of gas stream temperature, pressure, and Reynolds number. Heat flux and wall temperature distribution downstream from the liquid film were measured. A brief investigation of combined film cooling and convective cooling was conducted. Theoretical studies also were conducted to obtain relationships for predicting the convective heat transfer coefficient between a liquid film and a flowing hot gas stream, the insulation effect provided by the film coolant vapor for areas downstream from the liquid film, and the cooling requirements when external convective cooling is supplemented with internal film cooling. The resulting equations correlated the experimental data with reasonable accuracy. (Author)

AD-285 280 Div. 27, 9
(TISTA/GEC) OTS price $5.60

Oklahoma State U., Stillwater.
AN EXPERIMENTAL STUDY OF AERODYNAMICALLY VARIABLE THROAT AREA (AVT) NOZZLES.
Master's thesis,
by William N. Jackomis. Aug 62, 54p. incl. illus.
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, *Gases, *Theses, Aerodynamics, Thrust, Pressure, Combustion chamber gases, Exhaust gases, Gas flow, Model tests, Test methods, Control systems, Injection.

A study was made of thrust nozzles having aerodynamically variable throat areas (AVT Nozzles), developed by providing injection of a secondary gas at high velocity at the throat. If this were applied to a solid propellant rocket having a pressure exponent near unity, the smaller throat area would result in a greatly increased chamber pressure, mass flow rate, and thrust. An approximate analysis of this effect, cold air test results for 3 AVT nozzles having radial secondary injection angles of 0, +15, and -15 degrees relative to the throat plane, and a specific numerical example are presented. Test results indicated that area variation by secondary throat injection was feasible. It is shown that the pressure in the combustion chamber of a solid-propellant rocket is sufficient to provide secondary fluid, if the attendant nozzle heating can be tolerated. Conversely, if cold secondary fluid is provided, a significant nozzle throat cooling effect should be possible. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-284 566 Div. 28
(TISTB/AW) OTS price $1.10

Institute for Social Research, U. of Michigan, Ann Arbor.
ADMINISTRATIVE FACTORS AFFECTING SCIENTIFIC PERFORMANCE.
Final rept., 15 July 61-14 Jan 62,
by Donald C. Pelz. 1 Sep 62, 3p.
(Grant no. DA-ORO(D)-31-124-G-160)
(AROD 0010:7) Unclassified report

DESCRIPTORS: *Engineering personnel, *Scientific personnel, Attitudes, Job analysis, Needs, Psychometrics, Employee relations, Research program administration, Effectiveness, Scientific reports.

Identifiers: Motivation, Human performance.

Data were collected from 1311 scientists and engineers in 11 R & D laboratories in university, industrial, and government settings. Motivations and working relations were obtained from questionnaires; measures of scientific performance are based on colleague judgments and on numbers of papers, patents, and other scientific output during the past five years. General purpose of the study: to determine motivational and social psychological factors related to scientific performance, in a variety of research atmospheres. Data tentatively suggest that scientists perform better when they devote about two-thirds of their time (not more) to technical work, and the rest to teaching or administration. Performance also tends to be high when some time is spent in research, some in development, and a little in technical services--in short, when time is balanced among several technical functions. Better performance occurs when influence on important decisions does not rest solely with the scientist nor any other individual. (Author)

AD-284 569 Div. 28
(TISTB/AW) OTS price $1.60

New York U., N. Y.
CLASSIFICATION OF EFFECTS OF MODIFIERS ON DISCRETE FREE ASSOCIATIONS MADE TO VERBAL COMPOUNDS.
Technical rept. no. 8 on Learning, Retention and Recovery of Meaningful Material,
by Charles N. Cofer. July 62, 10p. 5 refs.
(Contract Nonr-28547)
Unclassified report

This is a revised version of a paper given in a Symposium on Mediating Processes in Verbal Behavior at the Meeting of the American Psychological Association, 9 Sep 1959 in Cincinnati, Ohio.

DESCRIPTORS: *Language, *Verbal behavior, Distribution, Memory, Test methods.

Certain contextual effects in word-association studies are discussed, and several mechanisms are probably involved: pairs operating as units, connotative implications of adjectives, suppressing or limiting functions of adjectives, and direct transfer of high frequency responses from the components to the compound. No one theoretical basis is expected to account for all of these mechanisms. Two avenues of study that seem to be promising are: (1) the study of the same combinations and components by a variety of methods, for example, both rating methods associative methods; and (2) the design of compounds so that various kinds of associative relations will be present. (Author)

Division 28 - PSYCHOLOGY AND HUMAN ENGINEERING

AD-284 784 Div. 28
(TISTB/AW) OTS price $1.60

Operational Applications Lab., Air Force, Cambridge Research Center, Washington, D. C.
A QUASI-RANDOM SEQUENCE FOR MEMORY EXPERIMENTS,
by Raymond S. Nickerson and Charles R. Brown.
Nov 61, 8p.
(Proj. 9674)
(ESD TDR 61-55)
Unclassified report

DESCIPTORS: *Memory, Sequences, Learning, Design, Test methods.

A method is presented for constructing sequences with properties which make them useful in ordering stimuli for recognition memory experiments. A main feature of the method is the facility for controlling and efficiently manipulating the number of items occurring between the initial and subsequent occurrences of given items. (Author)

AD-284 892 Div. 28
(TISTB/AW) OTS price $8.60

Educational Testing Service, Princeton, N. J.
THE EFFECT OF ''HUMAN'' VS. ''MACHINE'' SET ON GROUP PROBLEM-SOLVING PROCEDURES.
A Technical Report and Research Bulletin,
by John K. Hemphill and Carolyn B. McConville.
Feb 62, 1v. incl. illus. tables, 9 refs. (Rept. no. RB-62-3)
(Contract Nonr-295900)
Unclassified report

DESCRIPTORS: *Group dynamics, *Reasoning, Attitudes, Man, Effectiveness, Test methods, Machines.

The effects of sets toward the characteristics of his partner upon the actor's subsequent behavior when he is involved in a group problem-solving situation were explored. Two sets were created: one in which the subject believed he was interacting with a 'human' as partner, and another with a 'machine' as partner. The hypothesis tested was that the individual will approach the task in the same manner regardless of differences in these sets toward the origin of the response to his acts. Twelve pairs of men and 12 pairs of women were run separately under each condition. The tasks were identical for all subjects: to achieve a 'goal square' in a 5 x 5 electrical plug board in a minimum number of moves. Data relating to the following were analyzed: effectiveness of task solution; attitudes toward the task, the subject's acts, and the responses to his acts; prediction of the 'other's' behavior; and patterns of acts and responses. The panels of data relating to effectiveness, prediction, and patterns showed no difference for the subjects under the two conditions. The attitudinal measure showed that those subjects working under the 'human' conditions regarded their partners as more confused than did those working under the 'machine' condition. Although the results of this experiment cannot be generalized, they indicate the existence of components in such tasks that are not dependent on social characteristics that have been commonly studied. (Author)

AD-284 902 Div. 28
(TISTB/AW) OTS price $12.00

Fordham U., New York.
STUDIES IN LIE DETECTION. COMPUTER FEASIBILITY CONSIDERATIONS,
by Joseph F. Kubis. June 62, 160p. incl. illus. tables, 10 refs.
(Contract AF 30(602)2270, Proj. 5534)
(RADC TR 62-205) Unclassified report

DESCRIPTORS: *Criminology, *Lie detectors, Feasibility studies, Computers, Decision making, Test methods, Standardization, Physiology, Measurement, Identification.

A series of experiments on various aspects of lie detection which have special reference to the possible use of a computer in lie detection are discussed. Significant results were obtained in a simulated theft experiment. The lie detection examiners were able to differentiate with significant accuracy among the thief, the lookout, and the innocent suspect. Independent raters, who based their decisions only on the physiological recordings, were able to attain the same degree of accuracy as the examiners. Of the three physiological systems employed, the psychogalvanic response was evaluated with greatest objectivity and was found to yield the most valid results. In the denial-of-actual-crime and in the denial-of-classified-information experiments, success in detecting lies was limited. The countermeasure techniques experiment indicated that individuals with a moderate amount of training can contaminate the physiological records with irrelevant responses which enable them to confuse the lie detector operator and thus elude detection. The Countermeasures Techniques experiment points up the possible sources of invalidity in the traditional lie detection procedures. Despite the positive findings, limitations in objectivity, uncontrolled invalidating influences, and non-standardized instrumentation in this field create a need for further definitive research before the computer can be considered as an integral component of the lie detection decision. (Author)

AD-284 922 Div. 28
(TISTB/AW) OTS price $21.00

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
HUNGER IN GROUPS: AN ARCTIC EXPERIMENT.
Interim report on Human Factors in Quartermaster Corps Operations,
by Richard W. Seaton. Aug 62, 351p. incl. tables, refs. (QMFCIAF rept. no. 34-62)
Unclassified report

DESCRIPTORS: *Hunger, *Group dynamics, Sensory deprivation, Stress (Physiology), Stress (Psychology), Military psychology, Arctic regions, Greenland, Military rations.

A test of underfeeding in the Arctic during the summer of 1960 is presented. The experiment used two replicated cycles, each consisting of a five-day control phase followed by two five-day experimental phases during which subjects trekked over the Greenland Icecap man-hauling sleds. Variables included eight sub-groups paired into five-man teams, two feeding conditions, and two work conditions. Reliable confirmation of previous reports was provided for some phenomenological effects: e.g., weakness, sensitivity to minor task increments, and concern about health and hygiene. Alleged sensitivity to cold was unconfirmed, and sexuality appeared to be a concomitant of the general stress situation rather than a specific correlate of hunger. That time passes more slowly for hungry men also was not supported by subjects' reports. Social effects of hunger on groups included reduced talk and humor, and increased complaining about minor strains. Contrast between effects of external demand stress and hunger deprivation stress was notable.

AD-284 977 Div. 28
(TISTB/AW) OTS price $1.60

Naval Training Device Center, Port Washington, N. Y.
VISUAL PERSISTENCE DECAY CURVES AS FA FUNCTION OF INTENSITY AND DURATION OF THE STIMULUS,
by William C. Obert-Thorn. June 62, 22p. incl. illus. tables, 9 refs. (Technical rept. no. NAVTRADEVCEN IH-1)
Unclassified report

DESCRIPTORS: *Visual afterimages, *Vision, Stimulation, Time, Brightness, Test methods.

The magnitude of a persisting visual sensation as it declines with time, or the decay function of a persisting visual sensation is described. The method used involved finding the critical interval between two successive flashes of light, the first flash of greater intensity than the second flash. The decay function was estimated from the time the magnitude of the persisting sensation was 63.1 per cent of its initial magnitude to the time it declined to 6.31 per cent of its initial magnitude. Decay curves were obtained for two photopic intensity levels, differing by 2.25 log units, and two stimulus durations, 25 ms and 50 ms. The curves were obtained monocularly for the fovea of the eye using white light. Three subjects were used, two complete sessions with each. (Author)

AD-285 183 Div. 28
(TISTB/AW) OTS price $4.60

Applied Psychological Services, Villanova, Pa.
AN INVESTIGATION INTO FACTORS AFFECTING CONTROL ACTIVATION. V. STUDIES OF TOGGLE SWITCHES AND ROTARY SWITCHES, CONTROL COMPLEXITY AND LINK MULTIPLICITY.
Report on Human Engineering Investigations of Aircraft Cockpit Visual Displays,
by Douglas G. Schultz and Arthur I. Siegel. 25 June 62, 41p. incl. illus. tables, 8 refs. (Rept. no. NAMC-ACEL-487)
(Contract N156-40376) Unclassified report

DESCRIPTORS: *Human engineering, *Toggle switches, Control, Cockpits, Reaction time, Rotary switches.

Completing a series of primary studies of 6 factors purported to affect control activation speed and accuracy, several investigations into the factors of control complexity and link multiplicity are reported. Control activation time was not altered, to any practically significant degree, by variations in control complexity. Link multiplicity was found to be related, probably linearly, to control activation time. Under identical conditions of control complexity, activation time was significantly greater for the detented rotary controls employed than for the toggle switches employed. Based on the findings of the entire series of studies of this research program, it is suggested that control number, control density, link multiplicity, and time criticality be retained as factors in an over-all control activation predictive index, but that activation sequence and control complexity not be included. (Author)

AD-285 184 Div. 28
(TISTB/AW) OTS price $4.60

Michigan U., Ann Arbor.
VALIDATION OF PERSONALITY TESTS AS MEASURES OF TRAIT-RATING FACTORS.
Final technical documentary rept.,
by Warren T. Norman. Apr 62, 36p. incl. illus. tables, 14 refs.
(Contract AF 41(657)269, Proj. 7717)
(PRL TDR 62-4) Unclassified report

DESCRIPTORS: *Psychometrics, *Personality tests, Design.

As the final phase of a test-development project, 3 forced-choice self-report tests were administered to student groups to develop empirical scales predictive of peer-nomination personality ratings drawn from the same groups. Five factor scales were developed for each test. For the independent sample of a double cross-validation analysis, all of the scales correlated positively with their criteria. Combined scales for the 3 tests showed usefully high correlations. Multiple regression analyses demonstrated that scores from other personality tests administered to the students did not add appreciably to prediction of the peer-nomination scores. The self-report tests yield better prediction (.38-.47) of 3 of the peer-nomination factors (Extroversion, Conscientiousness, Culture) than of Agreeableness (.31, .34) or Emotional Stability (.26, .29). From a second adminstration of the self-report tests with instructions to fake responses favorable for acceptance for officer training, detection keys were derived that identified a high percentage of faked performances, and factor scales were developed which reduced the occurrence of faked scores in the extremes of the distributions. (Author)

AD-285 263 Div. 28
(TISTB/AW) OTS price $18.00

Michigan U., Ann Arbor.
THE EFFECTS OF UNCERTAINTY AND MONETARY INCENTIVES ON ESTIMATION.
Doctoral thesis,
by Edwin Irwin Golding. 1962, 276p. incl. illus. tables, 70 refs.
Unclassified report

DESCRIPTORS: *Decision making, *Information theory, *Games theory, *Probability, Statistical analysis, Reasoning, Money, Effectiveness, Needs.

Further knowledge about the bias and inaccuracies of individuals' estimates to perform tasks which have uncertain outcomes is provided. The standard deviation of a sample distribution of discrepancies between subjects' estimates and their actual outcomes does not approach a theoretical standard deviation calculated for a straw man using a random solution strategy, irrespective of the amount of uncertainty in the task. Monetary incentives were seen to effect the direction of estimates and the amount of their discrepancy. Bonus incentives tended to drive estimates and actual outcomes closer together. Competition for one prize drove the variables further apart. Over the range of uncertainty investigated, both conditions of incentives caused substantial reduction in the variables being recorded and in the variance of their distributions. As long as chance was an element to contend with in the performance of a task, fallible estimations, irrespective of the range of uncertainty, did not cease to exist. Requiring subjects to make point estimates instead of specifying intervals which would include their actual outcomes only encouraged further fallible estimations. (Author)

AD-285 266 Div. 28
(TISTB/AW) OTS price $5.60

Institute for Social Research, U. of Michigan, Ann Arbor.
ADMINISTRATIVE FACTORS AFFECTING SCIENTIFIC

PERFORMANCE.
Interim technical rept.,
by Donald C. Pelz. Sep 62, 53p. incl. illus.
(Analysis memo. no. 18)
(Grant DA-ORO(D)-31-124-G160)
(AROD rept. no. 0010.6)
Unclassified report

DESCRIPTORS: *Scientific personnel, *Management engineering, Effectiveness, Time, Distribution, Psychometrics, Job analysis.

The Multiple Classification Analysis (MCA) program was applied to study the relationships of 34 questionnaire measures to five performance scores. Because of certain flaws in procedure, only part of the MCA output is meaningful, but the raw data for all measures can legitimately be examined. The data tentatively suggest that scientists perform better when they devote about two-thirds of their time (not more) to technical work, and the rest to teaching or administration. Performance also tends to be high when some time is spent in research, some in development, and a little in technical services--in short, when time is balanced among several technical functions. Better performance occurs when influence on important decisions does not rest solely with the scientist nor any other individual, but is shared with several persons at various levels. (Author)

AD-285 300 Div. 28
(TISTB/AW) OTS price $17.50

Applied Mathematics and Statistics Labs., Stanford U., Calif.
STIMULUS SAMPLING THEORY,
by Richard C. Atkinson and William K. Estes.
1 July 62, 274p. incl. illus. tables, refs.
(Technical rept. no. 48)
(Contracts Nonr-22517, Nonr-90816 and Grant M-5184)
Unclassified report

DESCRIPTORS: *Psychology, *Learning, *Sampling, Applied mathematics, Social sciences, Statistical processes, Decision making, Probability, Theory.

Some of the fundamental mathematical techniques of stimuls sampling theory are presented. The simplest of all learning models - the pattern model for simple learning is presented in which the population of available stimulation is assumed to comprise a set of distinct stimulus patterns, exactly one of which is sampled on each trial. In the important special case of the one-element model, it is assumed that there is only one such pattern and that it recurs intact at the beginning of each experimental trial. The one-element model is worthy of study not only for expositional purposes but also for its value as an analytic device in relation to certain types of learning data. After a treatment of pattern models for simple acquisition and for learning under probabilistic reinforcement schedules, the conceptualization of generalization and transfer is discussed; the component models in which the patterns of stimulation effective on individual trials are treated, not as distinct elements, but as overlapping samples from a common population; and, finally, some examples of the more complex multiple-process models which are becoming increasingly important in the analysis of discrimination learning, concept formation, and related phenomena are discussed. (Author)

AD-285 318 Div. 28
(TISTB/AW) OTS price $2.60

Washington U., St. Louis, Mo.
STRUCTURAL FACTORS AND INDIVIDUAL NEEDS IN GROUP BEHAVIOR.
Annual rept.,
by Richard deCharms and Robert L. Hamblin.
Nov 62, 23p. refs.
(Contract Nonr-81611)
Unclassified report

DESCRIPTORS: *Group dynamics, *Needs, Behavior, Leadership, Sociology, Effectiveness, Production.

Contents:
Relative differential rewarding, task interdependence, and group productivity
The interference-aggression law
Conflict, interference, and aggression - computer simulation of a social process
Status, authoritarianism, and impression formation
Studies of leadership behavior
Time perception as a measure of affect in a competitive and non-competitive situation
A study of risk-taking in children
Achievement motivation and academic achievement
A study of affective arousal

AD-285 324 Div. 28
(TISTB/AW) OTS price $1.60

American Inst. for Research, San Mateo, Calif.
RETENTION OF MATERIAL PRESENTED BY AUTOINSTRUCTIONAL PROGRAMS WHICH VANISH AND WHICH DO NOT VANISH VERBAL CUES,
by David Angell and Arthur A. Lumsdaine. Aug 62, 12p. tables, 13 refs. (Research rept. no. AIR-C14-8/62-TR)
(Contract AF 49(638)681)
Unclassified report

DESCRIPTORS: *Learning, *Teaching machines, Conditioned reflex, Effectiveness, Test methods.

Subjects' performance on tests of immediate and delayed retention was measured following instruction by two versions of an autoinstructional program: one version employed vanishing (the successive reduction of stimulus support) and the other did not. Classes of 4th-, 5th-, and 6th-grade students served as Ss. No significant difference between the performance of Ss who had used the vanishing and the nonvanishing versions of the program was found on the immediate test. On the test taken two weeks after initial training, however, the Ss who had used the vanishing version of the program were found to have retained significantly more than Ss who had used the nonvanishing version. The results are interpreted in terms of the effects of context variables upon retention. (Author)

AD-285 379 Div. 28
(TISTB/AW) OTS price $8.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
MANUAL OF STANDARD PRACTICE FOR HUMAN FACTORS IN MILITARY VEHICLE DESIGN,
by Robert E. Hedgcock, John W. Lewis, and Francis M. McIntyre, Aug 62, 104p. incl. illus. tables, 20 refs. (Technical memo. no. 21-62)
Unclassified report

DESCRIPTORS: *Human engineering, *Vehicles, *Handbooks, Vehicle seats, Vehicle instruments, Safety, Safety devices, Toggle switches, Rotary switches, Wrenches, Coding, Colors, Control, Tools, Illumination, Indicator lights,

Visibility, Temperature, Ventilation, Vibration, Standards, Standardization, Noise, Design.

Human factors engineering recommendations for military vehicles in the areas of operability, maintainability, and safety are listed. These recommendations are oriented toward use by human factors specialists. Neither the areas of interest nor the contents of these areas is exhaustive. An attempt has been made to indicate relational values of various recommendations in order to facilitate trade-off decisions. (Author)

AD-285 416 Div. 28
(TISTB/AW) OTS price $1.10

Texas Christian U., Fort Worth.
DIMENSIONS OF STIMULUS SITUATIONS WHICH ACCOUNT FOR BEHAVIOR VARIANCE.
Annual progress rept.,
by S. B. Sells. 1 Oct 62, 7p.
(Contract Nonr-343600)
Unclassified report

DESCRIPTORS: *Behavior, *Psychometrics, Group dynamics, Reaction (Psychology), Classification, Factor analysis.

An investigation of stimulus situations, characteristic of the physical and social environment, that might account for the unaccounted variance in individual and group behavior which cannot be predicted by personality traits and aptitudes was made. Current empirical research involves the collection of data from undergraduate students to sample both their individual characteristics and the environmental stimuli to which they are exposed. Future plans involve the dimensionalization of social and physical environmental events into composite clusters that will help predict behavioral criteria, and contribute to the endeavor of constructing a taxonomy of situational variables to give a more complete account of behavioral variance. (Author)

AD-285 435 Div. 28, 12
(TISTB/AW) OTS price $6.60

Ballistic Systems Div. (Norton Air Force Base), Calif.
PERSONNEL SUBSYSTEM RELIABILITY,
by Melvin S. Majesty. 17 May 62, 1v. incl. illus. tables, refs.
Unclassified report

Presented at the National Aerospace Systems Reliability Symposium 16-18 Apr 62, Salt Lake City, Utah.

DESCRIPTORS: *Symposia, *Astronautics, *Aviation personnel, *Human engineering, Errors, Man, Military training, Selection, Spaceships, Space weapons, Astronautics, Symposia, Reliability.

Contents:
Personnel subsystem reliability for aerospace systems
Prediction of personnel subsystem reliability early in the system development cycle
The prediction and measurement of human reliability
Application of a personnel performance metric
Human error potential in today's ballistic missile systems
Bowdlerization

AD-285 549 Div. 28
(TISTB/AW) OTS price $.50

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
PSYCHOMOTOR PERFORMANCE UNDER CONDITIONS OF WEIGHTLESSNESS.
Final report on Human Performance in Advanced Systems,
by James E. Wade. June 62, 7p. incl. illus. tables.
(Proj. 7184)
(MRL TDR 62-73) Unclassified report

DESCRIPTORS: *Human engineering, *Weightlessness, Acceleration, Effectiveness, Toggle switches, Rotary switches, Switches.

Subjects operated three different sets of switches as they were flown through 0-G trajectories in a C-131B aircraft. Push-button, toggle, and rotary switches were each paired with a master push-button switch to form the three sets used to turn an indicator light on and off. The subjects were instructed to perform the task as fast as possible by alternate actuation of the two switches of each set. Each subject also performed in straight and level flight with each set of switches for control data. Performance data, along with aircraft accelerative forces in three dimensions, was recorded on a high-speed oscillograph. Small decrements were found in speed of operation of all three sets of switches in the 0-G environment in comparison with performance at 1-G. The toggle switch set showed the greatest decrement, the rotary switch set the least decrement. The push-button switch set was operated most rapidly in both 1-G and 0-G conditions. (Author)

AD-285 565 Div. 28
(TISTB/AW) OTS price $2.75

Lehigh U., Bethlehem, Pa.
MATHEMATICAL THEORIES IN PERFORMANCE DECISION MAKING, AND LEARNING. A LITERATURE REVIEW.
Final rept., Feb 59-Aug 60 on Psychological Research on Human Performance,
by Arthur L. Brody and Solomon Weinstock.
July 62, 113p. incl. tables, 402 refs.
(Contract AF 33(616)6179, Proj. 7183)
(MRL TDR 62-76) Unclassified report

DESCRIPTORS: *Bibliography, *Psychology, *Decision making, *Learning, Games theory, Information theory, Probability, Behavior, Mathematical prediction, Applied mathematics, Theory.

Literatures on mathematical theories in psychology between 1930 and 1959 were reviewed to provide an introduction for the nonmathematically trained researcher. The review is restricted to information theory, game and decision theory, and probabilistic learning theories. Conclusions were that: (a) information theory has provided a language and an information measure but has not been used as a theory; the information measure and the noisy channel theorem are used heuristically; (b) applications of game and decision theory fail to satisfy any of the

evaluative criteria; and (c) probabilistic learning theories have been developing soundly. However, the Estes theory needs to be extended to a broader variety of situations while the Bush-Mosteller theory needs a subsidiary learning theory to solve problems of coordination of theoretical terms with experimental variables and to define its range of application. (Author)

AD-285 598 Div. 28, 1
(TISTB/AW) OTS price $5.60

Human Sciences Research, Inc., Arlington, Va.
INFORMATION AVAILABLE FROM NATURAL CUES DURING FINAL APPROACH AND LANDING,
by M. Dean Havron. Mar 62, 45p. incl. illus. tables, 12 refs. (Rept. no. HSR-RR-62/3-MK-X)
(Contract FAA/BRD-401, Proj. 421-5R)
Unclassified report

DESCRIPTORS: *Landing aids, *Space perception, *Visual perception, Pilots, Motion, Landing, Aviation safety, Optical illusions.

The effectiveness of guidance the pilot may obtain from his viewing the apparent expansion pattern of the earth is evaluated. Formulae are presented which describe the apparent speeds of movement of ground objects during final approach. Next, human factors data are brought together to estimate perceptual thresholds for movement. Speeds of movement expressed as iso-velocity curves are then compared with perceptual thresholds of motion to evaluate the effectiveness of guidance that the apparent expansion pattern of earth can provide for touchdown point, heading and flare-out. Results must be considered tentative because human factors data available for estimation of thresholds were collected under laboratory rather than field conditions. Further, quantitative values of thresholds for perception of movement vary widely among reports in the literature. A better understand of extra-cockpit cues available and how pilots can best use them should have import for pilot training, for better understanding of conditions conductive to false guidance and optical illusions, for better and more economical design of AML systems and for flight saeety. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-285 103 Div. 29
(TISTB/SAT) OTS price $1.60

Evaporated Milk Association, Chicago, Ill.
STUDIES ON PHYSICAL STABILITY AND TIN PLATE DETERIORATION IN CANS OF EVAPORATED MILK HELD UNDER REFRIGERATION.
Rept. no. 1 (Final), 27 Apr 59-26 Apr 61, by E. H. Parfitt. 26 Apr 61, 6p. 10 tables
(Rept. no. D-324)
Unclassified report

DESCRIPTORS: *Containers, *Dehydrated substances, *Milk, Tin, Chemical impurities, Spectrophotometers, Vitamin B, Electrophoresis, Thiamine, Riboflavin, Iron, Lead, Chemical analysis, Storage, Deterioration,

Changes occurring in evaporated milk held for 4 years at a refrigerated temperature of 32 degrees.

AD-285 188 Div. 29, 20
(TISTB/MD) OTS price $2.60

Pillsbury Mills, Inc., Minneapolis, Minn.
INVESTIGATION AS TO THE MERITS OF IRRADIATION IN INCREASING THE SHELF LIFE OF CEREAL PRODUCTS AT LOW OR HIGH MOISTURE LEVELS.
Rept. no. 11 (Final), 2 May 55-31 Dec 61, by Howard E. Bauman, Helen Baeder and others. 31 Dec 61, 19p. incl. tables.
(Proj. 7-84-01-002)
Unclassified report

DESCRIPTORS: *Dry food mixes, Aging, Bacteria, Molds, Flour, Sucrose, Fats, Egg white, Odors, Acceptability, Storage, Gamma rays, Deterioration, Radiation effects.

White and spice cake mixes and the individual ingredients were irradiated at 50,000 to 1,000,000 reps. Although irradiation produced practically sterile mixes, it did not retard the rate of chemical deterioration and did not increase shelf life. Irradiation was actually detrimental to the baking qualities of the unstored dry mix, flour, sucrose, shortening and dried egg albumen.

AD-285 213 Div. 29
(TISTB/AW) OTS price $1.00

Midwest Research Inst., Kansas City, Mo.
PRECOOKED DEHYDRATED MEALS FOR AIR FORCE CONDITIONS.
Rept. no. 1 (Final) 5 July 60-15 Feb 62, by B. W. Beadle. 15 Feb 62, 34p. incl. illus. tables.
(Contract DA 19-129-qm-1645)
Unclassified report

DESCRIPTORS: *Military rations, *Dehydrated substances, Space flight, Packaging, Heaters, Acceptability, Design, Freeze drying, Preservation.

A set of meals for personnel on medium-duration flights has been developed. These meals consist of compatible, precooked, dehydrated, readily rehydratable food items. They are packaged, along with the necessary water to prepare them, in a specially developed light-weight container in which the food can be prepared and from which it can be eaten. The meals can be warmed to serving temperature by a distinctive heating device developed for the purpose. (Author)

AD-285 216 Div. 29, 16, 26
(TISTB/AW) OTS price $2.50

Quartermaster Corps, Washington, D. C.
RESEARCH AND DEVELOPMENT LIAISON
Nov 61, 112p.
(In cooperation with Department of Agriculture, Washington, D. C.)
Unclassified report

DESCRIPTORS: *Food, *Textiles, *Leather, *Chemicals, *Polymers, *Packaging, *Soils, *Pest control, *Microorganisms, Acceptability, Nutrition, Preservation, Dyes, Fibers, Plastics, Dose rate, Meat, Fruits, Dehydration, Milk, Elastomers, Military requirements, Military research, Military rations.

Research and development programs, progress in respective work areas, cooperative endeavors of each agency, and examples of beneficial liaison activities are described. Research and development activities are grouped under the general fields of (a) food, (b) textiles and leather, (c) chemicals and polymers, (d) packaging, (e) environmental and soil research, and (f) pesticides and microbiological investigations. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-284 573 Div. 30
(TISTP/FR) OTS price $2.60

Naval Research Lab., Washington, D. C.
AN X-RAY DIFFRACTION DATA REDUCTION PROGRAM FOR THE IBM 704 AND 7090,
by H. G. Norment. 24 Aug 62, 21p. incl. illus. table (NRL rept. no. 5739; Addenda to NRL rept. no. 5739, AD-273 719)
Unclassified report

DESCRIPTORS: *Programming, Digital computers, Single crystals, X-ray diffraction analysis.

Because of crystal shape, size, or other experimental difficulty, it frequently happens that single-crystal x-ray diffraction data can be obtained on film from only one crystal setting. When Weissenberg or precession techniques are used, the problem of how to correlate the relative scales of the independently observed sets of data is an imposing one because of the absence of any set of data containing reflections common to two or more layers. In the original form of the data reduction program (XRDDR), the only provision for handling this situation was the automatic bypassing of the interlayer scale correlation computation (in subroutine LSQCOR) in the case where data were observed from only one setting. This provision allowed for options 1 and 2. XRDDR has been revised so as to allow for a third option. (Author)

AD-284 680 Div. 30
(TISTP/FR) OTS price $4.60

RAND Corp., Santa Monica, Calif.
FORTAB: A DECISION TABLE LANGUAGE FOR SCIENTIFIC COMPUTING APPLICATIONS,
by G. W. Armerding. Sep 62, 39p. incl. illus. 5 refs. (Research memo. no. RM-3306-PR)
(Contract AF 49(638)700)
Unclassified report

DESCRIPTORS: *Language, *Programming, Digital computers, Scientific research.

FORTAB is a decision table language based on the FORTRAN scientific computing language. Programs written in the combined FORTAB and FORTRAN languages can be compiled by a FORTAB pre-processor program which was constructed for the IBM 7090 computer. Initial experiments conducted using the FORTAB language indicate that a decision table language added to a scientific computing language results in a powerful combination of programming tools. (Author)

AD-284 786 Div. 30, 1
(TISTB/AW) OTS price $9.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
TEST AND EVALUATION OF FLIDEN AND MODEL 28 ASR PROGRAMMATIC EQUIPMENTS.
Final rept.,
by George Apostolakis, Stephen D. Benson and others. Mar 61, 1v. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Programming, *Display systems, *Business machine operators, *Air traffic control systems, Tests, Maintenance, Operation, Instruction manuals, Errors, Cathode ray tubes, Typewriters, Training, Electronic equipment, Data processing systems, Teletype equipment, Data transmission systems, Digital computers.

The FLIDEN and 28 ASR Programmatic were operationally and technically evaluated. The operational evaluation was designed to evaluate two different input devices for the Univac File Computer System and to determine what aspects of the FLIDEN display were essential for the optimal man-machine relationship. Four different display configurations of the FLIDEN were tested, ranging from the optimal condition of both format and operator typed copy being displayed to the least desired condition where the display is blank. An integral part of the operational evaluation was the employment of different skill levels in subject groups in order to determine if significant differences between them existed. The technical evaluation of the 28 ASR Programmatic and FLIDEN considered such topics as: maintainability of equipments, equipment modifications, and adequacy of the technical manuals as instruction books. During the test period, a number of malfunctions appeared in the FLIDEN which necessitated detailed technical investigations. A series of transmission tests was also conducted utilizing the 28 ASR Programmatic (serially) and FLIDEN (serially and parallel) to transmit messages into the Univac File Computer via the High-Speed Paper Tape System. (Author)

AD-284 917 Div. 30, 6
(TISTP/WH) OTS price $6.60

Philco Corp., Palo Alto, Calif.
RESULTS OF FIXED BIAS COVARIANCE COMPUTER PROGRAM - JANUARY-JULY 1962.
23 Aug 62, 56p. incl. illus. (Rept. no. WDL-TR1893)
(Contract AF 04(695)113)
Unclassified report

DESCRIPTORS: *Satellite vehicle trajectories, *Mathematical prediction, *Position finding, *Programming, *Errors, *Tracking.

A compilation is presented of results from the Fixed Bias Covariance computer program. The program is used to determine errors in prediction of satellite position resulting from tracking equipment inaccuracies. Most of the computer runs were made to answer specific questions about particular tracking situations, and thus an overall plan governing their choice will not be discerned. However, the collection of the data may be of general interest for preliminary estimates of tracking requirements for other systems and for planning future studies. (Author)

AD-284 964 Div. 30, 2
(TISTP/WH) OTS price $5.60

Iowa Engineering Experiment Station, Ames.
SONIC ANEMOMETER DATA ACQUISITION AND ANALYSIS SYSTEM AND CALCULATION OF EULERIAN SCALE OF TURBULENCE FROM BIVANE DATA.
Final rept.,
by Robert M. Stewart, Jr., Robert E. Post and others. 3 Mar 62, 52p. incl. illus. tables, 14 refs.
(Contract AF 19(604)2661, Proj. 7655)
(AFCRL 62-465) Unclassified report

DESCRIPTORS: *Sound ranging, *Anemometer, *Instrumentation, *Meteorological data, *Meteorological instruments, *Turbulence, Sound, Meteorology, Statistical analysis.

AD-284 973 Div. 30
(TISTP/TL) OTS price $21.00

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
SOME ASPECTS OF THE STATE ASSIGNMENT PROBLEM FOR SEQUENTIAL CIRCUITS,
by Donald Russell Haring. Sep 62, 355p. incl.

illus. tables, 47 refs. (Rept. no. ESL-R-147)
(Contract AF 33(616)7700)
Unclassified report

DESCRIPTORS: *Switching circuits, Digital systems, Memory devices, Synthesis, Coding, Computers, Computer logic.

One of the major steps in the synthesis of switching circuits containing memory is the binary coding of the internal states. The choice of code, called the state assignment, strongly affects the complexity of the circuit realization. Hence, the objective is to find, for a given sequential machine (SM) as typically specified by a flow table and an output table, that state assignment (SA) which minimizes the sequential circuit (SC) complexity. The point of view is taken that the greatest lack in promoting an understanding of the SA problem is a knowledge of the structure of the relationship between the properties of the SM and the properties of the logic required by its SC realization. Consequently, a large part of this report is devoted to developing and using some new techniques for studying the structure of this SM-SC relationship. (Author)

AD-284 980 Div. 30, 2
(TISTP/JW) OTS price $3.60

Naval Underwater Ordnance Station, Newport, R. I.
PROCESSING OCEANOGRAPHIC STATION DATA USING RAPID DATA-HANDLING EQUIPMENT,
by Carl F. Morey. Aug 62, 33p. incl. illus. 24 refs. (Technical memo. no. 284)
Unclassified report

DESCRIPTORS: *Data processing systems, *Oceanographic data, Underwater, Tracking, Plotters, Test vehicles, Statistical processes.

A procedure was developed for processing oceanographic station data utilizing automatic data processing equipment. This procedure offers the advantage of rapid automatic processing through standard steps, with individual attention through steps which require a degree of professional judgment. The output of this processing system includes station profile plots, isometric section charts, and statistical variations computed in time and space. (Author)

AD-285 000 Div. 30, 25, 16, 32, 2
(TISTB/MD) OTS price $2.60

Agricultural Research Service, Cornell U., Ithaca, N. Y.
PHOTOSYNTHESIS UNDER FIELD CONDITIONS: SOLAR RADIATION BALANCE AND PHOTOSYNTHETIC EFFICIENCY. Report on The Energy Budget at the Earth's Surface,
by C. S. Yocum, L. H. Allen and E. R. Lemon. July 62, 12p. illus. 9 refs. (Interim rept. no. 62-3)
(In cooperation with New York State Coll. of Agriculture, Cornell U., Ithaca)
Unclassified report

DESCRIPTORS: *Solar energy, *Spectrophotometers, *Photosynthesis, Corn, Mathematical analysis, Infrared radiation, Measurement, Design.

A spectrophotometer suitable for field use in measuring solar radiation in the range between 0.3 and 1.0 microns is described. Components of the system include a direction integrator, a dispersing element, a detector, an amplifier, and a recorder which plots system response vs wavelength. Measurements of the spectral characteristics of 0.3 to 1.0 microns radiation penetrating a dense stand of corn are reported. Transmission data are illustrated for two widely differing conditions--a clear day and a heavily overcast day. Transmission, reflection, and absorption data for a single corn leaf are included. Measurements indicate that in the photosynthetically active part of the spectrum, 10 to 14 percent of the incident radiation reaches the 40-cm level in corn that is 300 cm high. Calculations indicate maximum thermal efficiency of photosynthesis under the experimental conditions to be 40 percent of the yield obtained from laboratory grown chlorella. (Author)

AD-285 003 Div. 30, 12
(TISTA/SEB) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
AN EROSION GAUGE.
Research note,
by L. E. Della Lucca, R. A. Skrivanek, and R. K. Soberman. June 62, 8p. incl. illus. 4 refs.
(AFCRL-62-640)
(Proj. 7667)
Unclassified report

DESCRIPTORS: *Erosion, *Scintillation counters, Test methods, Measurement, Surfaces, Satellite vehicles, Spaceships, Radiation instruments, Radioactive isotopes, Test equipment.

A system for measuring small variations in film thickness was developed. The detector, although originally developed for measuring surface erosion on a space vehicle, can also be used for accurate laboratory measurements. The system uses a radioactive tracer technique, monitored by a scintillation counter connected to a pulse height analyzer. For space vehicle application the use of a three-channel pulse height analyzer is particularly advantageous since it allows one to separate background radiation and electronic drift from the desired activity levels, while using only three DC level telemetry points. The first detectors to be flown will monitor the erosion of vacuum evaporated silver films approximately 100A thick. An accuracy of 3% is expected from the flight detectors. (Author)

AD-285 038 Div. 30, 25, 26
(TISTM/ODN) OTS price $6.60

General American Transportation Corp., Niles, Ill.
CONTAINER FAILURE DETECTION SYSTEM.
Interim technical progress rept. no. 3, 1 May-31 Aug 62,
by A. B. Wieczorek, G. L. Schmitz and M. B. Levine. Sep 62, 57p. incl. illus.
(Contract AF 33(657)7461)
(ASD TR 915, vol. 3) Unclassified report

DESCRIPTORS: *Containers, *Detection, *Nondestructive testing, Electromagnetism, Ultrasonic radiation, Ultrasonics, Tests, Transducers, Magnetic defectors, Bibliography, Configuration, Test equipment, Couplings, Failure (Mechanics).

Contents:
Electromagnetic inspection system
  Test results:
    Flaw sensitivity
    Lift-off variation
    Scan speed
    Extrusion residue characteristics
    Natural crack
    Conclusions
  Ultrasonic inspection:
    Model billet container
    Scanning system
    Tests results

Transducers
Coupling and couplants
Determination of radial crack depth
Bibliography

AD-285 046 Div. 30, 8
(TISTP/JW) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PROJECT 861 COMPUTER PROGRAM SYSTEM; AUXILIARY PROGRAMS AND TECHNIQUES,
by J. D. Drinan and A. A. Mathiasen. 6 Sep 62, 23p. incl. illus. tables, 4 refs. (Rept. no. 21G-3)
(Contract AF 19(628)500)
(AFESD TDR 62-132) Unclassified report

DESCRIPTORS: *Computers, *Programming, *Orbital flight paths, Data processing system, Computer logic, Direction finding, Antennas, Control systems.

A system of computer programs was implemented for orbit computation and antenna pointing. The major programs are reported in various individual memoranda. However, a group of auxiliary programs was required and a variety of special data-handling techniques were developed. For record purposes, this miscellaneous group of programs and techniques is reported. (Author)

AD-285 105 Div. 30, 13
(TISTE/CRJ) OTS price $5.60

Office of the Director of Defense Research and Engineering, Washington, D. C.
MENEX MAINTENANCE ENGINEERING EXCHANGE BULLETIN NO. 4.
Aug 62, 34p.
Unclassified report

DESCRIPTORS: *Maintenance, *Bibliography, Maintenance equipment, Maintenance personnel, Maintenance tools, Electronic equipment, Human engineering, Ground support equipment, Test equipment, Life expectancy, Reliability,

A listing is presented of documents relating to maintenance engineering and maintainability, including such aspects as specifications, measurement, engineering and design guides, as well as the relationship of maintainability to such factors as reliability, performance, logistics, etc. This fourth bulletin lists new items, along with a reprint of all titles and abstracts published in the preceding three issues, and provides author, source and subject indexes. (Author)

AD-285 165 Div. 30, 5
(TISTP/JW) OTS price $2.60

Lincoln Lab., Mass. Inst. Tech., Lexington.
DIVISION 5. INFORMATION PROCESSING.
Quarterly progress rept., 1 June-31 Aug 62.
14 Sep 62, 12p.
(Contract AF 19(628)500)
(AFESD TDR 62-133) Unclassified report

DESCRIPTORS: *Data processing systems, *Digital computers, *Reports, Circuits, Telephone communication systems, Solid state physics, Transition elements, Voice communication systems, Speech representation, Speech transmission, Computers, Magnetic materials, Electronic equipment, Mathematical analysis, Films, Memory devices, Design.

AD-285 179 Div. 30, 25, 8
(TISTB/AW) OTS price $4.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
UNCLASSIFIED PUBLICATIONS OF LINCOLN LABORATORY. SUPPLEMENT 1.
15 Apr 62, 42p. (Supplement 1 to 15 July 1961 edition, AD-264 714)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: *Reports, *Solid state physics, Computers, Digital computers, Analog computers, Atmosphere entry, Microwaves, Radio waves, Digital systems, Magnetic fields, Electronics, Computer logic, Electronic equipment, Translations, USSR, Conferences, Communication systems, Radar, Scientific reports.

This list of Unclassified Publications of Lincoln Laboratory is a Supplement to the 15 July 1961 edition, which should be retained until a new cumulative listing is published. A Bibliography of Technical Publications, classified Confidential, is available to organizations with established clearances and need-to-know. (Author)

AD-285 191 Div. 30, 8
(TISTE/CAM) OTS price $5.60

Radiation, Inc., Palo Alto, Calif.
SUPER-POWER KLYSTRON TUBE-TEST FACILITY.
Quarterly rept. no. 7, 1 Apr-30 June 62,
by Roby L. Blessing. 30 June 62, 1v. incl. illus. 10 refs. (Rept. no. G-108-Q7)
(Subcontract to Varian Associates, Palo Alto, Calif.)
Unclassified report

DESCRIPTORS: *Klystrons, *Test facilities, *Triodes, Test equipment, Installation, Power supplies, Resistors, Modulator tubes, Circuits, Capacitors, Design, Radiofrequency power, Switching circuits, Electron tubes.

This report includes:
Machlett Labs. Inc., Springdale, Conn.
DEVELOPMENT OF A 350-KV, 25-AMPERE PULSE TRIODE.
Final rept. 1 Nov 60-29 June 62, 12p. illus.
(Rept. no. G-108-1)
(Subcontract to Radiation, Inc., Palo Alto, Calif.)

AD-285 201 Div. 30
(TISTP/JW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
A METHOD FOR IMPROVING ORGANIZATION IN LARGE COMPUTER-GENERATED INDEXES,
by Lauren B. Doyle. 27 June 61, 19p. 10 refs.
(Technical memo. no. TM-628)
(Contract AF 33(600)37684)
Unclassified report

DESCRIPTORS: *Computer logic, *Computers, Digital computers, Programming, Language, Feedback, Indexes.

General consideration of some of the necessities of language data processing program development is discussed. First, programs are grouped into classes based on the kinds of improvements needed in their development. Second, the use of feedback is explored in the improvement of two of these classes of programs. Finally, the discussion narrows its focus to a method of using 'linguistic feedback' to improve the organization of computer-generated indexes. (Author)

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-285 251 Div. 30
(TISTP/FR) OTS price $6.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
DEVELOPMENT OF A SKYSCREEN COMPUTER.
Final rept., 1 June 60-12 July 62, by Anthony Marmarou, Richard H. Field, and Charles A. Belsterling. 12 July 62, 64p. incl. illus. (Rept. no. F-A2435-01)
(Contract DA 36-034-509-ORD-3241)
Unclassified report

DESCRIPTORS: *Analog computers, Phototheodolites, Guided missiles, Tracking, Trigonometry, Equations, Servo systems, Power supplies.

This report describes the functional requirements, development and tests of a new electromechanical analog computer. Its purpose is to position blanking screens in a missile-tracking phototheodolite camera to avoid overexposure of the photographic plate. Azimuth and elevation information are continuously varying inputs from a tracking instrument. The Skyscreen Computer solves the trigonometric equations necessary to transform the spherical coordinates of the target with respect to the tracking instrument into rectilinear coordinates of the focal plane in the phototheodolite. The Skyscreen Computer System was developed successfully using ultra-precise electromechanical devices, all solid-state electronic circuits and high-quality mechanical components. Laboratory tests show that the System positions the aperture in the camera screens with an average error of 0.4 mm and a maximum error of 1.0 mm. These results indicate an overall average accuracy of one part in 320 which approaches the reasonable limit of a complex analog system. (Author)

AD-285 267 Div. 30
(TISTW/RD) OTS price $8.60

Naval Ordnance Lab., White Oak, Md.
PRINCIPAL LABORATORY TEST FACILITIES OF THE ENVIRONMENT SIMULATION DIVISION, NOL,
by W. C. Brueggeman. Sep 62, 91p. incl. illus. tables (NOLTR 62-30)
Unclassified report

DESCRIPTORS: *Test facilities, *Naval research laboratories, Temperature, Humidity, Climatic factors, Spray tanks, Hypervelocity guns, Shock resistance, Vibration, Corrosion, Tests, Projectile fuzes, Instrumentation, Naval ordnance.

A description with photographs is presented of the principal test facilities of the Environment Simulation Division, NOL. Basic information on capacity and performance is included. The principle of operation is briefly explained where this is not obvious. The report is expected to be valuable for training new design and evaluation engineers of the Laboratory and in serving as a handbook while they are developing test programs. (Author)

AD-285 296 Div. 30, 18, 33
(TISTE/CRJ) OTS price $8.10

Reed Research, Inc., Washington, D. C.
PRACTICAL AND THEORETICAL BASES FOR SPECIFYING A TRANSPORTATION VIBRATION TEST,
by G. S. Mustin and E. D. Hoyt. 25 Feb 60, 79p. incl. illus. table, 33 refs.
(Contract NOrd 16687, Proj. RR 1175-36)
Unclassified report

DESCRIPTORS: *Vibration, *Military transportation, *Cargo, Transportation, Theory, Statistical analysis, Test equipment, Vibration isolators, Packaging, Containers, Mathematical analysis, Failure (Mechanics), Reliability, Shock, Motion, Damping, Logistics, Standardization, Test methods, Standards, Guided missiles, Handling.

Each service's material probably will be carried by rail, truck, ship or airplane from factory to the ultimate consumer. Despite similarity of total vibration environment, at least seven different vibration tests are prescribed. Emphasis is on developing a theoretical basis for a laboratory test since theory will define the numerical values of the shipping environment which should be collected. A modern statistical theory (theory of random vibration) is indicated. Equations show content mean square response in terms of suspension natural frequency and damping ratio and the environmental characteristics of acceleration spectral density and bandwidths. Linear fatigue accumulation concepts are used as a basis for realistically shortening test times. Two expressions equate sinusoidal test response amplitude and time with field time and the field response amplitude previously derived. The equations show that it is sufficient, when evaluating the suspension, to vibrate at a single frequency, preferably the lowest resonant.

AD-285 348 Div. 30
(TISTP/MS) OTS price $10.10

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE FORAST PROGRAMMING LANGUAGE FOR ORDVAC AND BRLESC,
by Lloyd W. Campbell and Glenn A. Beck. Aug 62, 132p. (BRL rept. no. 1172)
(Proj. 503-06-002)
Unclassified report

DESCRIPTORS: *Programming, Coding, Effectiveness, Design, Computers.

FORAST is a problem oriented programming language designed for use on the ORDVAC and BRLESC computers at BRL. Although it was designed for professional programmers, FORAST contains sufficient simple concepts to make it usable by a novice or journeyman. It permits the use of arithmetic formulas, some English word statements, and each computer accepts its own symbolic or absolute machine language. The latter feature permits the professional programmer to use the full power of each computer. (Author)

AD-285 356 Div. 30, 16
(TISTB/AW) OTS price $11.00

Cornell U., Ithaca, N. Y.
ANALOGUE MEMORY MECHANISMS FOR NEURAL NETS.
Rept. no. 3 on Cognitive Systems Research Program. Doctoral thesis,
by George Nagy. 31 Aug 62, 149p. incl. illus. tables, 66 refs.
(Contract Nonr-40140)
Unclassified report

DESCRIPTORS: *Memory devices, *Brain, *Nerves, Reasoning, Electrical networks, Electronic integrators, Computer logic, Magnetostrictive elements, Electronic circuits, Theory, Instrumentation, Wire, Nickel alloys, Iron alloys, Coils, Simulation.

The need for a component capable of simulating semi-permanent changes in biological neurons, suitable for inclusion in brain models, and in perceptrons in particular, is discussed. Various devices intended for this purpose are reviewed and evaluated. A novel method of flux integration, using a permalloy wire as the flux storing medium, and the voltage induced in a search coil

as the result of magnetostriction in the wire for readout, is described in detail. The design procedure for the complete memory of an audio-perceptron, Tobermory, based on the magnetostrictive readout integrator, is oulined. Modifications in the integrator, intended to render it suitable for larger and topologically more sophisticated models, are anticipated. (Author)

AD-285 393 Div. 30
(TISTP/MS) OTS price $10.50

Naval Ordnance Lab., White Oak, Md.
ARABIC NUMERAL TIME ACCUMULATOR FOR SOMTER PLAYBACK SYSTEM MOD 2,
by George J. Moss, Jr. 25 July 62, 117p. incl. illus. tables, 6 refs. (Rept. no. NOLTR 62-31)
Unclassified report

DESCRIPTORS: *Computers, *Digital recording systems, *Circuits, Numerical methods and procedures, Matrix algebra, Equations, Sequences, Electronic circuits, Memory devices, Counting methods, Design.

The SOMTER Arabic Numeral Time Accululator (SANTA) is an electronic counter scaled in time units, with a capacity of twenty days. Input may be in the form of pulses representing either one minute or one second intervals. On receipt of an actuating signal, SANTA generates coded electrical signals suitable for printing of its contents in Arabic numeral format with a digital recorder with a single row of electric stili. The logical design, circuit design, and output voltage waveforms of SANTA are discussed. (Author)

AD-285 472 Div. 30
(TISTP/MS) OTS price $1.60

Operational Applications Office, Air Force Electronic Systems Div., Bedford, Mass.
TED: A TAPE EDITOR,
by Charles R. Brown and Donald W. Connolly. Sep 62, 9p.
(Proj. 2806)
(ESD TDR 62-218) Unclassified report

DESCRIPTORS: *Digital computers, *Reading machines, *Programming, Coding, Control systems.

The principle and operation of utility program for the PDP-1 computer are described. The program is an aid in the editing of alphanumeric text in that the operator may communicate with the computer in the very alphanumerics of the test itself. It is a computer time-saver in that the modifications and the control instructions for their accomplishments may be prepared at an inexpensive, off-line machine. (Author)

AD-285 520 Div. 30
(TISTA/GEC) OTS price $1.10

Cornell U., Ithaca, N. Y.
(No title)
Final rept., 1 Nov 59-1 May 62,
by W. R. Sears. 24 Sep 62, 6p. 25 refs.
(Contract AF 49(638)544)
Unclassified report

DESCRIPTORS: *Scientific research, Jets, Flaps, Theory, Boundary layer, Gas flow, Aerodynamics, Hypersonics, Shock waves, Hypersonic flow, Superaerodynamics, Plasma physics, Magnetohydronamics, Research program administration.

Annotations are presented on scientific research at Cornell University in the fields of jet-flaps, unsteady boundary-layer flow, gas dynamics with chemical effects, hypersonic flow, rarefied-gas dynamics, plasma dynamics, and magneto fluid-dynamics.

AD-285 534 Div. 30,23
(TISTB/AW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
APPLICATION OF RESEARCH ON PROGRAMED INSTRUCTION TO SCHOOL SYSTEMS,
by Harry F. Silberman. 29 Aug 62, 5p. (Rept. no. SP-949)
Unclassified report

To be presented at the American Psychological Association annual mmeting, August 31, 1962, St. Louis, Missouri.

DESCRIPTORS: *Education, *Teaching machines, Automation, Communication systems, Data transmission systems.

The argument is presented that a better impedance match between laboratory and school would be made if one took a wider view of the media through which programing principles are implemented. Research reports should allow the educational decision-maker to take action on the basis of these reports. CLASS (Computer-Based Laboratory for Automated School Systems), an experimental facility developed at SDC as an approach to designing a sequence of steps leading from research on programing to its practical application in schools, is discussed. (Author)

AD-285 535 Div. 30, 23
(TISTB/AW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
INFORMATION RETRIEVAL SYSTEMS AND EDUCATION,
by Don Bushnell and Harold Borko. 29 Aug 62, 10p. incl. illus. (Rept. no. SP-947)
Unclassified report

To be presented at APA Convention, 1 September 62, at St. Louis, Missouri.

DESCRIPTORS: *Information retrieval, *Education, *Teaching machines, Automation, Data transmission systems.

An information retrieval (IR) system that would adequately serve the information needs of the educator and student is discussed. Such a system would include functions already automated in present IR hardware systems and, in addition, the automation of acquisition, classification, and dissemination functions. Extrapolation from the research in the last three areas leads to a description of an advanced school system of the 1970's in which universities or secondary schools will be linked by data transmission lines to regional information centers. These centers will acquire, translate, and select items of information for automatic indexing, abstracting, and coding into magnetic tape files and for subsequent feeding to remote school systems. All elements in the educational system will be serviced by the integrated information retrieval systems which will organize and disseminate the information according to individual needs. (Author)

AD-285 547 Div. 30
(TISTP/TL) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THESAURUS OF THE NEAMES OF ELECTRONIC DIGITAL COMPUTERS AND DATA PROCESSORS,
by Martin H. Weik and Violet J. Confer. Sep 62, 17p. (BRL Technical note no. 1472)
(Proj. 503-06-002)
Unclassified report

DESCRIPTORS: *Catalogs, *Digital computers, *Data processing systems, Identification systems.

A complete list of the names, aliases, and model numbers of all electronic digital computing and data processing systems ever developed in the U. S., with references to proper nomenclature and the names and addresses of the manufacturers. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-284 576 Div. 31, 13, 4
(TISTM/EJH) OTS price $2.25

Naval Research Lab., Washington, D. C.
THE PRESENT STATUS OF CHEMICAL RESEARCH IN ATMOSPHERE PURIFICATION AND CONTROL ON NUCLEAR-POWERED SUBMARINES.
Annual progress rept. no. 2 for 1961,
ed. by V. R. Piatt and J. C. White. 29 Aug 62, 97p. incl. illus. tables, refs. (NRL rept. no. 5814)

Unclassified report

DESCRIPTORS: *Submarines, *Controlled atmospheres, Nuclear propulsion, Ventillation, Oxygen, Carbon dioxide, Production, Absorption, Sodium compounds, Sulfates, Electrolysis, Chlorates, Ethanes, Algae, Amines, Chromatographic analysis, Sampling, Activated carbon, Gas detectors, Infrared spectroscopy, Aerosols, Electrostatic precipitation, Air, Purification.

Considerable progress has been made in the major efforts to develop (1) the sulfate-cycle system for the electrolytic generation of O from water and the absorption of CO2, (2) improved methods for producing chlorate candles and increasing their O content (and output), and (3) improved methods of sampling and analyzing atmospheres. Other topics covered in this report include the use of algae for O production and CO2 absorption, Freon and general-purpose leak detectors, properties of monoethanolamine (MEA), catalytic combustion studies using hopcalite, and removal of aerosols with electrostatic precipitators.

AD-284 659 Div. 31, 27
(TISTP/JW) OTS price $10.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
HYDRODYNAMICS AND STABILITY AND CONTROL OF A TANDEM PROPELLER SUBMARINE.
Final rept. on Phase 1,
by D. C. Clark and F. Dell'Amico. Aug 62, 126p. incl. illus. tables, 11 refs. (CAL rept. no. AG-1634-V-2)
(Contract Nonr-365900)

Unclassified report

DESCRIPTORS: *Submarines, *Stabilization systems, *Hydrodynamics, *Propeller blades, *Variable pitch propellers, *Marine propellers, Propulsion, Pitch, Thrust, Control systems, Feasibility studies, Automatic, Stability.

Hydrodynamic and stability and control characteristics are investigated for a novel submarine configuration employing tandem, large hub-to-diameter ratio propellers whose blades can be pitched collectively and cyclicly. The propulsion and lateral control forces which can be produced by the propellers at very low forward speeds (including zero) are defined by means of simple blade-element theory that includes, however, the effects of propeller-induced, axial inflow velocity. The resulting analysis is used to study the problem of trimming the submarine at hovering speeds. The analysis indicates that the TPS can be stabilized and controlled at high speeds. Maneuvering performance in the pitch-plane is equivalent to that of a conventional submarine except that a higher percentage of the total available control effectiveness must be used in diving maneuvers. The minimum turning radius of the TPS, when operating at high speeds, is approximately five times that of a conventional submarine. At lower speeds, the turning performance of the TPS becomes superior to that of the conventional submarine. (Author)

AD-284 796 Div. 31, 19, 15
(TISTP/WH) OTS price $1.60

Operations Evaluation Group, Office of Naval Operations, Washington, D. C.
MINIMIZING THE APPROACH TIME OF AN SSK TO ITS TARGET.
Interim rept.,
by Joseph Bram. 13 Aug 62, 10p. (Interim research memo. no. IRM-21)

Unclassified report

DESCRIPTORS: *Antisubmarine warfare, *Navigation, *Pursuit courses, *Digital computers, Differential equations, Calculus of variations.

Killer submarine A detects an enemy submarine B moving with a uniform velocity, v knots. The submarine A wants to place himself at a position h miles directly ahead of B as quickly as possible, but is constrained not to exceed a speed f(r), where r is the range between A and B, so as to keep the probability of B's hearing A down to a fixed level. (The faster A moves, the noisier he is.) We suppose that A knows the required function f(r). Find the path that minimizes A's approach time. The differential equations that describe the path, are described and their computer solution is indicated. (Author)

AD-285 217 Div. 31, 14
(TISTE/CAM) OTS price $1.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF DAMPING TREATMENTS FOR NEW CONSTRUCTION SUBMARINES.
Progress rept. no. 13,
by Jacob Oser. 27 Sep 62, 8p. illus. tables.
(Rept. no. 94-41)
(Proj. S-F013-13-01)

Unclassified report

DESCRIPTORS: *Ships plates, *Submarine hulls, *Submarines, Damping, Effectiveness, Measurement, Test methods, Rubber, Plastic, Polymers, Materials, Vulcanizates, Temperature, Steel, Aluminum.

The development of elastomeric materials to replace chromated felt in constrained-layer treatments for damping heavy plating in new construction submarines is discussed. A new treatment, Treatment 230, was developed which consisted of an aluminum constraining layer 1-1/4 in. thick, and perforated butyl rubber damping layer, 1/16 in. thick, which was made from stock 384-597. The treatment was tested on a 1-3/4 in. thick steel bar. Its weight was 25% of the weight of the bar. Average damping by the new treatment between 50 and 2000 c was 5.8% of critical at 35 F, and 2.6% at 120 F. This treatment was less sensitive to temperature changes between 35 and 120 F than a similar chromated-felt treatment, Treatment 198. It also yielded higher damping than Treatment 198 between 35 and 55 F, and between 100 and 120 F, but lower dampings between 60 and 85 F. At 35 F, the new treatment was fivefold as effective as Treatment 198. (Author)

AD-285 269 Div. 31, 21
(TISTM/ODN) OTS price $.50

Naval Research Lab., Washington, D. C.
NUCLEAR SUBMARINE ATMOSPHERES. ANALYSIS AND REMOVAL OF ORGANIC CONTAMINANTS.
Interim rept.,
by J. E. Johnson. 10 Sep 62, 10p. incl. illus. tables, 19 refs. (NRL rept. no. 5800)
Unclassified report

DESCRIPTORS: *Submarines, *Atmosphere, *Contamination, *Analysis, Quality control, Hydrocarbons, Activated carbon, Catalysts, Combustion, Air, Nuclear propulsion.

This laboratory has carried out a program of sampling and analysis of the atmospheres of nuclear submarines for the identification and estimation of organic contaminants. Most of these organic compounds have been found to be hydrocarbons. The total hydrocarbon content of submarine atmospheres was initially very high but has decreased to very low values in many cases by means of careful control measures. Individual aromatic hydrocarbons have been isolated with an estimation of their concentrations. The principal sampling method is based on the exposure of activated carbon on shipboard followed by desorption of the carbon in the laboratory. The most useful means of removing organic contaminants from the submarine atmospheres are combustion by means of a catalyst and adsorption by activated carbon contained in large filter beds. Calculations of the effectiveness of these measures under various conditions of use were made based on typical analytical data. (Author)

AD-285 505 Div. 31
(TISTA/GEC) OTS price $1.60

Naval Air Test Center, Patuxent River, Md.
EVALUATION OF C7 CATAPULT SERVICE CHANGE 140.
Interim rept. no. 1,
by K. deBooy. 31 Aug 62, 17p. incl. illus. tables (Serial no. FT2222-259)
Unclassified report

DESCRIPTORS: *Catapults, Flight testing, Load distribution, Landing gear, Launching, Nose wheels, Attack bombers, Jet bombers, High pressure valves, Orifices, Naval aircraft.

Installation of a catapult service change was considered a probable cause of excessive airplane nose gear loads during shipboard catapult launchings. Installation of the change in the C7 catapult at the Naval Air Test Center did not significantly alter airplane nose gear loads or catapult performance. Reduction of the flat plate launching valve orifice size from the 0.213 to 0.191 in. with the service change installed reduced C7 catapult endspeeds 4 to 5 kt. It is recommended that the specified launching valve orifice (0.213 in.) be utilized in the installation of Catapult Service Change 140. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-285 001 Div. 32, 25
(TISTP/GRW) OTS price $4.60

Agricultural Research Service, Cornell U., Ithaca, N. Y.
PHOTOSYNTHESIS UNDER FIELD CONDITIONS: RADIANT ENERGY EXCHANGES WITHIN A CORN CROP CANOPY AND IMPLICATIONS IN WATER USE EFFICIENCY,
by L. H. Allen, C. S. Yocum, and E. R. Lemon.
July 62, 23p. incl. illus. tables, 15 refs.
(Interim rept. no. 62-4)
(In cooperation with New York State Coll. of Agriculture, Cornell U., Ithaca)
Unclassified report

DESCRIPTORS: *Thermal radiation, *Corn, Agriculture, Heat transfer, Infrared radiation, Wave transmission, Photosynthesis, Terrain, Evapotranspiration.

Data are reported from net radiation measurements at various heights in a dense crop of corn. One net radiometer was mounted at a height of 420 cm, about 120 cm above the top of the corn plants. Net radiation measurements at selected levels in the canopy were taken with a mobile radiometer as it moved along a 100-ft course between two corn rows. Transmission data obtained for the respective heights with a Miller field light transmission photometer indicate that shortwave transmission can be expressed as an exponential function of height, as well as of cumulative leaf area index. To a first approximation, net thermal radiation was an exponential function of height except at lower levels and at the top of the crop. A photosynthetic efficiency of 6.84% was obtained from calculations using data for radiation absorbed vs plant dry matter produced. On a daily energy basis, the potential transpiration/potential photosynthesis ratio was 16. Soil water evaporation was calculated and estimated that it could constitute 17% of the total evapotranspiration. (Author)

AD-285 065 Div. 32
(TISTB/AW) OTS price $7.60

Princeton U., N. J.
ON THE ACCURACY OF NATIONAL INCOME AND GROWTH STATISTICS,
by Oskar Morgenstern. 1 Aug 62, 71p. incl. illus. tables, refs. (Research memo. no. 43)
(Contract Nonr-185816)
Unclassified report

DESCRIPTORS: *Economics, Statistical data, Errors, Growth, Great Britain, Determination, Production.

This report includes:
THE VALIDITY OF ECONOMIC GROWTH STATISTICS AND GROWTH RATES. 1962, 22p. incl. tables.

The rudimentary information obtained about errors in national income statistics shows that these important statistics are in especial need of decisive improvement. The present exaggerated practical applications must be avoided. It is not unusual to consider changes in the national figures of plus or minus one-tenth of one percent as significant for either theory or policy. Growth rates as commonly computed from gross national product and national income data whose errors are known to be large, though they are not stated numerically by their makers, are completely worthless as far as international comparisons are concerned. International comparisons of the relative growth and development of different countries demand, in addition to qualitative, historical, sociological description, more specific indexes, carefully constructed from those activites that are relevant to these countries in regard to their location, climate, technology, policies, etc. Such indexes would exhibit some of the faults but they could perhaps be brought under some measure of control. (Author)

Division 32 - MISCELLANEOUS ARTS AND SCIENCES

AD-285 081 Div. 32
(TISTB/AW) OTS price $16.00

American Inst. for Research, Pittsburgh, Pa.
A TEXTUAL ABSTRACTING TECHNIQUE. A PRELIMINARY DEVELOPMENT AND EVALUATION SUPPORT. A SUPPLEMENTAL VOLUME,
by Dan Payne, Sara J. Munger, and James W. Altman. 23 Aug 62, 248p. incl. illus. tables, refs. (Rept. no. AIR C81-8/62-TR(a))
(Contract AF 30(602)2609, Proj. 4594)
(RADC TDR 62-372, suppl. 1)
Unclassified report

DESCRIPTORS: *Abstracting, Standardization, Design, Reliability, Scientific reports.

This report includes:
CONTROL SYSTEM SYNTHESIS BY ROOT LOCUS METHOD, by Walter. R. Evans. 22 Nov 49.

AN EXTENSION OF THE ROOT LOCUS METHOD TO OBTAIN CLOSED-LOOP FREQUENCY RESPONSE OF FEEDBACK CONTROL SYSTEMS, by Albert S. Jackson. 12 May 54.

FEEDBACK SYSTEM SYNTHESIS BY THE INVERSE ROOT-LOCUS METHOD, by John A. Aseltine. 1956.

A QUICK METHOD FOR ESTIMATING CLOSED-LOOP POLES OF CONTROL SYSTEMS, by Kan Chen. 3 Jan 57.

RAPID DETERMINATION OF APPROXIMATE CLOSED-LOOP POLES OF FEEDBACK CONTROL SYSTEMS, by S. K. Basu. 23 Dec 59.

ANALYSIS AND DESIGN OF FEEDBACK SYSTEMS WITH GAIN AND TIME CONSTANT VARIATIONS, by Kan Chen. 2 Feb 60, rev. 10 Nov 60.

A supplement to the report, ''A Textual Abstracting Technique: A Preliminary Development and Evaluation Support,'' (AD-285 082) is presented. Items associated with the exemplification and evaluation of the abstracting procedure resulting from the study are given. For a description of the development of the abstract procedure and its evaluation through a use-test, the reader should refer to the main volume. (Author)

AD-285 082 Div. 32
(TISTB/AW) OTS price $5.60

American Inst. for Research, Pittsburgh, Pa.
A TEXTUAL ABSTRACTING TECHNIQUE. A PRELIMINARY DEVELOPMENT AND EVALUATION SUPPORT,
by Dan Payne, Sara J. Munger, and James W. Altman. 23 Aug 62, 60p. incl. illus. tables, refs. (Rept. no. AIR C81-8/62-TR)
(Contract AF 30(602)2609, Proj. 4594)
(RADC TDR 62-372) Unclassified report

DESCRIPTORS: *Abstracting, Standardization, Design, Reliability, Scientific reports.

Guidelines for text reduction were developed and evaluated to advance the art of manually preparing informative abstracts. The study was intended to: (1) develop guidelines that result in abstracts which provide maximal support to abstract-users, and (2) develop these guidelines so that they result in reliable, i.e., consistent, abstracts of scientific/technical material. The abstracting procedure, and Abstracting Form and associated instructions, produces reasonably consistent abstracts. An expert judge rated 13 subsections of six technical papers prepared by three different abstracters as 88% consistent, i.e., contained identical information. The abstracts prepared were a substantial reduction of the original text. Considering the six abstracts used in a performance test (judged as containing the most information, but not necessarily the longest) mean percentage reductions obtained were: 47% reduction of words, 28% reduction of figures, and 27% reduction of equations. Level of performance, as measured by accuracy on use-tests, supported by abstracts was equivalent to that supported by original text, regardless of test time restriction. However, total test time required was less using abstracts than with full text. (Author)

AD-285 108 Div. 32
(TISTB/SAT) OTS price $2.50

Battelle Memorial Inst., Columbus, Ohio.
SURVEY AND ANALYSIS OF SPECIALIZED SCIENCE INFORMATION SERVICES IN THE UNITED STATES. Final rept.,
by I. J. Panning, B. A. Frautschi and others. Sep 62, 1v. incl. illus.
(Contract NSF-C149)
Unclassified report

DESCRIPTORS: *Scientific reports, *Documentation, *Information theory, Distribution, Processing, Literature, Research program administration.

AD-285 163 Div. 32
(TISTB/AW) OTS price $4.60

Institute for Cooperative Research, U. of Pennsylvania, Philadelphia.
TASK SILENCE. THE POST MIDNIGHT ALARM AND EVACUATION OF FOUR COMMUNITIES AFFECTED BY AN AMMONIA GAS RELEASE.
Rept. on Project Summit,
by Michael B. Albert and Louis Segaloff. 17 Sep 62, 37p. incl. illus. tables, 20 refs.
(Contract DA 18-064-cml-2757)
Unclassified report

DESCRIPTORS: *Disasters, *Sociology, Behavior, Air raid warning systems, Public address systems, Sound generators, Radio communication systems, Ammonia.

On 1 August, 1961, in Creve Coeur, Illinois, a rupture occured in a four-inch high pressure hose carrying liquid anhydrous ammonia from a river barge to a terminal. The residents of 4 towns were forced to evacuate their homes. Since the incident occurred in the early morning hours, extensive warning action was necessary to make certain that all residents were awakened and transported to safety. The evacuation was orderly, and no one was injured. There was no overall coordination and direction of warning, evacuation, and rescue operations. Two intercommunity warning actions are known. The communities on the east bank of the river cooperated with a minimum of formalities. Intercommunity communication by the police and fire radio nets appears to have been casual and under no restrictions. The coverage of the incident by the commercial radio stations supplied a measure of unofficial coordination and was an effective means of informing and advising residents after they had been awakened. The public accepted and acted on the information broadcast by the two commercial radio stations. (Author)

AD-285 170 Div. 32
(TISTB/AW) OTS price $1.60

Princeton U., N. J.
THE EFFECT OF VARYING MONTH-LENGTH ON ANALYSIS OF ECONOMIC TIME SERIES,
Report on Econometric Research Program,
by C. W. J. Granger. 30 July 62, 16p. incl. illus. 4 refs. (Research memo. no. 41)
Unclassified report

DESCRIPTORS: *Economics, *Series, *Time, Statistical analysis, Production.

The effects due to the number of days in a month or the number of working days in a month not being constant are considered. It is found that for instantaneously-recorded series the effect is negligible, but that accumulated series may be noticeably altered when the ratio between the mean and standard deviation is large. For such series, the high frequencies are most affected and spurious coherence between two such series may arise. (Author)

AD-285 445 Div. 32
(TISTB/AW) OTS price $14.50

Carnegie Inst. of Tech. Graduate School of Industrial Administration, Pittsburgh, Pa.
SIMULATION OF INFORMATION AND DECISION SYSTEMS IN THE FIRM.
Report on Planning and Control of Industrial Operations (Doctoral thesis),
by Charles P. Bonini. May 62, 202p. incl. illus. tables, 97 refs. (ONR research memo. no. 104)
(Contract Nonr-76001, Proj. NR-047-011; In cooperation with Stanford U., Calif., and California U., Los Angeles)
Unclassified report

DESCRIPTORS: *Management engineering, *Industrial research, *Decision making, *Economics, Simulation, Analysis, Costs, Social sciences, Industrial plants.

A simulation model of a hypothetical business firm is described. The model is a synthesis of some of the relevant theory from the several disciplines of economics, accounting, organization theory, and behavioral science, all within a setting of traditional concepts of business practice. The effects are studied of certain informational, organizational, and environmental factors upon the decisions of a business firm. The analysis is accomplished by making alterations in the model in parts of the firm and observing the effects of these alterations upon the firm's behavior. Thus, significant propositions about the behavior of business organizations in a laboratory-type experiment are formulated and tested. (Author)

33. TRANSPORTATION

AD-284 787 Div. 33, 1, 7, 16
(TISTA/VGW) OTS price $16.00

Human Sciences Research, Inc., Arlington, Va.
AIRPORT MARKING AND LIGHTING SYSTEMS: A SURVEY OF OPERATIONAL TESTS AND HUMAN FACTORS, 1959 - 1961,
by W. S. Vaughan, Jr., Terrence S. Luce, and R. G. Kassebaum. May 62, 1v. incl. illus. 64 refs.
(Rept. no. HSR-RR-61/13-Mk-X)
(Contract FAA/BRD-401)
Unclassified report

DESCRIPTORS: *Airports, *Beacon lights, *Approach lights, *Runway lights, *Landing lights, Luminescence, Visual acuity, Visual perception, Human engineering, Surface targets, Visibility, Bibliography, Lighting systems.

A report summarizing operational test results and human factors knowledge relevant to the design of airport marking and lighting systems, ''Airport Marking and Lighting Systems, A Summary of Operational Tests and Human Factors.'' HSR-RR-59/1-Mk, May 1959, summarized operational test results from the 1946 Arcata work on approach lighting to the 1958 tests of narrow gauge runway lighting at Dow Air Force Base. This present report is a supplement to the first and contains operational test results and human factors information generated during 1959-1961. Operational tests of airport marking and lighting since 1959 have been concentrated in three areas: beacon systems, approach and runway combined systems, and angle of approach indicators. Test results in these areas are summarized and individual reports are annotated. Human factors work during 1959-1961 is presented in five categories: pattern recognition, luminance and visual acuity, dynamic visual acuity and motion perception, size-distance judgments, and response latency to visual stimuli. (Author)

AD-284 979 Div. 33, 15
(TISTP/WH) OTS price $3.60

Naval Postgraduate School, Monterey, Calif.
OPTIMUM SHIP ROUTING,
by Frank D. Faulker. Sep 62, 25p. 7 refs.
(Research paper no. 32)
Unclassified report

DESCRIPTORS: *Transportation, *Course mapping, *Shipping, *Digital computers, Differential equations, Calculus of variations, Integrals, Navigation, Shipping.

Methods are presented for determining minimum-time ship routes on a digital computer. The first part of the analysis treats in detail a numerical method for determining the course which requires minimum time to go from one specified place to another when the speed of the ship is a known function of position, heading, and time. The second part of the analysis treats various related topics. The first is the corresponding problem in the simpler case wherein the speed is a function of position and heading but not of time. The second is a discussion of methods for obtaining the curves, called equal-time curves or isochrones, which yield the maximum distance the ship can attain at any particular time by choosing various courses. These are discussed for both the stationary and time-varying speed fields. Third, the problem of effecting rendezvous between two ships is treated. (Author)

AD-285 250 Div. 33
(TISTA/GEC) OTS price $3.60

Federal Aviation Agency, Washington, D. C.
AIR TRAFFIC FLOW PATTERNS.
June 62, 27p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Flight paths, *Air traffic, Air force operations, Commercial planes, Naval aircraft, Military aircraft, Operations research, Display systems, Civil aviation, Analog systems, Cathode ray tube screens, Recording systems, Analysis.

Air traffic flow patterns are presented pictorially. The flow patterns were developed from the flight paths of itinerant air carrier, general aviation and military aircraft over the Continental United States. The displays of air traffic flow were made on the Cartographatron, an electronic analog device which plots traffic data by means of a precision cathode ray tube used in combination with a photographic emulsion. Flow patterns generated by various classes of aircraft, by flight rules, by altitude strata and by other flight characteristics are shown. (Author)

AD-285 455 Div. 33
(TISTA/GEC) OTS price $5.60

Human Sciences Research, Inc., Arlington, Va.
HELIPORT LIGHTING DESIGN SOLUTIONS TO PILOT INFORMATION REQUIREMENTS.
Final rept.,
by T. R. Virnelson and W. S. Vaughan, Jr.
Dec 61, 52p. incl. illus. table, 34 refs. (Rept. no. HSR-RR-61/17-MK-X)
(Contract FAA/BRD-401)

Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Airports, *Landing fields, *Landing aids, Helicopters, Landing, Runways, Design, Runway lights, Beacon lights, Flight paths, Wind direction indicators, Drift, Human engineering, Pilots.

Information items which the helicopter pilot must obtain visually from outside the cockpit during an approach and landing are listed. Under each information item are described those proposed, existing, and previously-used visual aids which provide that item. Diagrams of the aids are included where necessary and available evaluations are summarized. Marking and lighting designs for helicopter landing areas, which incorporate several of the previously-described aids, are presented in three classes: military designs for tactical use, designs for use at small metropolitan heliports, and designs for use at runway-type heliports. Diagrams are provided for most designs and evaluations are summarized where available. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterik are included in the subject index.

BIBLIOGRAPHY

PB 181 426 $2.75

Naval Research Lab., Washington, D. C.
BIBLIOGRAPHY OF UNCLASSIFIED NRL FORMAL REPORTS NUMBERS 1000 TO 5700. July 62, 145p. 4,700 refs. NRL rept. 5700B.

DESCRIPTORS: *Bibliography, *Scientific reports, Naval research laboratories, *Naval research, *Indexes.

This Bibliography is divided into three sections. Section 1 lists numerically only the Unclassified NRL formal reports 1000 to 5700 giving the number and publication date at the left of the column and the title and authors at the right, below is the Office of Technical Services' PB number and price. Section 2 is an alphabetical author index and Section 3 is an alphabetical listing of series titles. A subject index is not contemplated. (Author)

AGRICULTURE

ORO-583 $8.10

Tennessee U. Agricultural Experiment Station, Knoxville.
SEMI-ANNUAL PROGRESS REPORT, 1 July-31 Dec 61, on Contract AT(04-1)-GEN-242. 81p. UT-ARL rept. no. 1.

Plant Cultivation

ORO-572 $1.60

Oklahoma U. Research Inst., Norman.
A STUDY OF THE EFFECTS OF AUXINS ON THE METABOLISM OF PLANTS, by Lawrence M. Rohrbaugh. Rept. on Contract AT(40-1)-1817. [1960] 13p.

TID-15439 $1.10

Oregon State U., Corvallis.
THE EFFECTS OF SOIL TEMPERATURE AND MORPHOLOGICAL AGE OF PLANTS ON THE UPTAKE AND ASSIMILATION OF RADIOACTIVE PHOSPHORUS, by S. B. Apple, Jr., H. J. Mack, and S. C. Fang. Rept. on Contract AT(45-1)-952. 1961. 6p.

Astrophysics

NASA N62-15409 $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SOLAR OBSERVATIONS WITH A SOFT X-RAY SPECTROMETER, by W. M. Neupert and W. E. Behring. Sep 62, 10p. 7 refs. Technical note D-1466.

PB 162 313 $7.60

Ohio State U. Research Foundation, Columbus.
NATURAL ENVIRONMENT OF THE PLANET VENUS, by John H. Shaw and N. T. Bobrovnikoff. Rept. on Preliminary Investigation of Interplanetary, Lunar and Near Planet Environments, Contract AF 33(616)5914. Feb 59, 76p. 176 refs. Phase technical note 847-2; AD-242 176.

DESCRIPTORS: *Venus, *Meteorology, Meteorological data.

A Summary is presented of the knowledge of the physical environment of the planet Venus. There are many aspects of this environment which are imperfectly understood at the present time because of the absence of adequate observational data. Attempts were made to estimate the probable environment in cases where it cannot be definitely established. (Author)

TID-16442 $4.60

Vanderbilt U., Nashville, Tenn.
THREE COLOR PHOTOMETRY OF THE SPECTRUM VARIABLE STAR 56 ARIETIS, by Norman Harold Schroeder. Master's thesis. June 62, 42p. 74 refs.

BEHAVIORAL SCIENCES

TID-11039 $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
USING SALARY HISTORY TO PREDICT PERSONNEL DEVELOPMENT, by Stanley R. Acker. 1 Nov 60. 7p.

BIOLOGICAL SCIENCES

BNL-5327 $1.10

Brookhaven National Lab., Upton, N. Y.
ELECTRON MICROSCOPY OF PHAGE FROM PHIZOBIUM TRIFOLII, by Mark E. Gettnex, B. A. Schwinghamer, and J. Bergeron. [1961] 5p. 4 refs.

UCLA-464 $1.60

California U., Los Angeles. School of Medicine.
AN IMPROVED SELF-STIMULATOR FOR ANIMAL EXPERIMENTS, by R. W. Farmer, O. Reiner, Jr., and N. Abell, Jr. Rept. on Contract AT(04-1)-GEN-12. 10 Nov 60, 18p. 4 refs.

TID-16593 $5.60

Colorado State U., Fort Collins.
COLORADO COOPERATIVE WILDLIFE RESEARCH UNIT. Quarterly rept. Jan-Mar 62, Vol. 15, no. 3. [1962] 49p. 8 refs.

BNL-4830 $2.60

Brookhaven National Lab., Upton, N. Y.
SOME PROBLEMS ASSOCIATED WITH THE HISTOLOGICAL STUDY OF CELL PROLIFERATION KINETICS, by Horton A. Johnson. [1960] 23p. 17 refs.

TID-16469 $1.60

Buffalo U., New York.
MONTE CARLO COMPUTATIONS OF TISSUE CELL GROWTH, by Joseph G. Hoffman. Progress rept. on Contract AT(30-1)-2462. 20 Aug 62, 20p. 11 refs.

Anatomy and Physiology

PB 181 424 $1.25

[6570th Aerospace Medical Research Labs., Aerospace Medical Div.] Wright-Patterson AFB, Ohio.
THE MECHANICAL IMPEDANCE OF THE HUMAN BODY IN SITTING AND STANDING POSITION AT LOW FREQUENCIES, by Rolf R. Coermann. Rept. on Acoustic Energy Control. Sep 61, 47p. 13 refs. ASD Technical rept. 61-492.

DESCRIPTORS: *Aerobiology, *Body, Posture, Vibration, Stress (Physiology), *Impedance, Test equipment, Vibrators, Transducers.

The theory of mechanical impedance of systems with 1 or more degrees of freedom is applied to the human body. A method of measuring mechanical impedance and determining parameters of the vibrating systems is developed. Impedance curves for longitudinal vibrations of a sitting and standing subject are established for the frequency range of 1-20 cps. The influence of varied posture and restraining systems is investigated. Dynamic movements of body parts are measured, directly or indirectly, and compared with the impedance curves. The responsible elements in the body for the apparent resonances are identified. Correlations between the impedance function of the body and the subjective tolerance curve to vibration are found and the reasons for the tolerance limits are elucidated. The variability of subjective tolerances due to varying posture, restraining systems, cushions, duration of exposure and vibrations are discussed, and conclusions for the development of protective devices are drawn. The correlation between the steady state response of the human body system and the effects of impact is discussed. (Author)

PB 162 344 $19.75

Office of the Surgeon General, Dept. of the Army, Washington, D. C.
SYMPOSIUM ON MILITARY PHYSIOLOGY. 4-6 4-6 DECEMBER 1947. [1947] 313p. 217 refs. RDB Digest series no. 4; RDB Committee on Geographical Exploration rept. no. GE 61/1; ATI-118 050.

DESCRIPTORS: Conferences, *Physiology, Military medicine, Scientific organizations, *Respiration, Aerobiology, Explosive decompression, Insects, Birds, Water vapor, Oxygen, Nitrogen, Respiratory diseases, Dyspnea, Edema, *Circulatory system, Heart, Blood vessels, *Neurology, Vibration, Hypertension, Anesthesia, Human engineering, Dental caries, Oxalates, *Metabolism, Folic acid, Amino acids, Radioactive isotopes, Heparin, Carbohydrates, Burns, Fevers, Fluorides, Phosphates, Cholenesterase, Thyocyanates, Cyanides, Creatinine, Inulin, Bone marrow, Hydrazines, Anemia, Insulin.

Biochemistry

BNL-4884 $3.60

Brookhaven National Lab., Upton, N. Y.
A HISTOCHEMICAL STUDY OF THE RELATIONSHIP OF MUCOPOLYSACCHARIDES TO CONNECTIVE TISSUE FIBERS DURING OSTEOGENESIS AND SKELETAL AGING, by Edgar A. Tonna. [1960] 32p. 18 refs.

TID-16499 $1.60

Kansas U., Lawrence.
THE INVESTIGATION OF ORGANIC SUBSTANCES TAGGED WITH I^{131} BY THE HUMAN GLAND IN VIVO. Final rept. 1 Sep 54-31 Aug 61, on Contract AT(11-1)-303. [1961] 11p. 13 refs.

TID-16223 $1.10

North Dakota U., Grand Forks.
CHROMATOGRAPHY OF LIVER PHOSPHOLIPIDS DURING THE DEVELOPMENT OF A FATTY LIVER, by W. E. Cornatzer and Adolf H. Walser. Rept. on Contract AT(11-1)-479. [1961]. 10p. 13 refs.

TID-16352 $1.10

Sloan-Kettering Inst. for Cancer Research, New York.
CHEMICAL AND BIOLOGICAL STUDIES ON NUCLEIC ACIDS AND DERIVATIVES, by George B. Brown and Aaron Bendich. Progress rept., 1 Jan-30 June 62, on Contract AT(30-1)-910. 20 July 62, 10p. 3 refs.

TID-16375 $1.10

Sloan-Kettering Inst. for Cancer Research, New York.
PHYSICAL-CHEMICAL STUDIES ON NUCLEIC ACIDS AND DERIVATIVES. Progress rept., 1 Jan-30 June 62, on Contract AT(30-1)-910. 20 July 62, 8p. 3 refs.

Pathology

BNL-5225 $2.60

Brookhaven National Lab., Upton, N. Y.
CARCINOMA OF THE COLON AND RECTUM IN CHILDREN, by Abbas Alaghemand. [1961] 29p. 45 refs.

Photographs will not reproduce.

BNL-5216 $1.60

Brookhaven National Lab., Upton, N. Y.
THE EFFECT OF THERAPY ON CELLS IN THE BLOOD OF LEUKEMIC PATIENTS CAPABLE OF INCORPORATING H^3 THYMIDINE, by V. P. Bond, J. R. Rubini and others. [1961] 14p. 8 refs.

Pharmacology and Toxicology

BNL-5229 $4.60

Brookhaven National Lab., Upton, N. Y.
PHENOTHIAZINES AND MANGANESE, by G. C. Cotzias and D. C. Borg. [1961] 41p. 108 refs.

TID-16385 $2.60

California U., Los Angeles. School of Medicine.
PHARMACOLOGY AND TOXICOLOGY OF TERBIUM, THULIUM AND YTTERBIUM CHLORIDES, by Thomas J. Haley, N. Komesu and others. Rept. on Contract AT(04-1)-GEN-12. Aug 62, 21p. 18 refs.

TID-16161 $1.10

Colorado U., Boulder.
ATTEMPTS TO PREPARE 5-THIO-TRYPTAMINE CREATININE SULFATE BY TWO DIFFERENT METHODS, by James L. Sanders. Rept. on Contract AT(11-1)-394. [1961]. 9p. 9 refs.

Radiobiology

TID-12089 $1.60

Argonne National Lab., Ill.
A THEORY OF THE IMPROVED PERFORMANCE AND SURVIVAL PRODUCED BY SMALL DOSES OF RADIATIONS AND OTHER POISONS, by George A. Sacher and Ernesto Trucco. Nov 60, 15p. 14 refs.

BNL-5340 $2.60

Brookhaven National Lab., Upton, N. Y.
EFFECTS OF RADIATION ON INTESTINAL ABSORPTION, by V. P. Bond. [1961] 23p. 58 refs.

BNL-5232 $2.60

Brookhaven National Lab., Upton, N. Y.
THE POSSIBILITY OF FIELD STUDY OF CHOLERA PATIENTS WITH RADIOACTIVE ISOTOPES USING GAMMA SPECTROSCOPY, by Lee E. Farr. [1960] 26p. 11 refs.

TID-16471 $2.60

Brown U., Providence, R. I.
RADIATION EFFECTS ON THE CYTOPLASM OF HABROBRACON EGGS, by Walter Kenworthy. Final rept. 1 June 56-31 May 62, on Contract AT(30-1)-1920. 31 May 62, 22p. 3 refs.

TID-16507 $1.60

Buffalo U., N. Y.
A STUDY OF LETHALITY AND PERMEABILITY CHANGES IN IRRADIATED MICROORGANISMS. Rept. on Contract AT(30-1)-2571. 28 Aug 62, 18p.

UCLA-461 $1.60

California U., Los Angeles. School of Medicine.
INFLUENCE OF X-IRRADIATION ON THE RESPONSE OF THE GUINEA PIG ENTERIC GANGLIA AND POST GANGLIONIC CHOLINERGIC NERVE ENDINGS TO DRUGS, by Thomas J. Haley, P. Williams and others. Rept. on Contract AT(04-1)-GEN-12. 26 July 60, 11p. 16 refs.

TID-16635 $1.60

Connecticut U., Storrs.
RADIOACTIVE ZINC-65 IN MARINE ORGANISMS IN FISHER'S ISLAND SOUND AND ITS ESTUARIES, by Donald M. Skauen and Bryant W. Fitzgerald. Summary and progress rept. 1 Dec 61-30 Nov 62, on Contract AT(30-1)-2487. 25 Aug 62, 13p. 8 refs.

HW-SA-2688 $2.60

Hanford Atomic Products Operation, Richland, Wash.
RELATIONSHIPS BETWEEN THE CONCENTRATION OF RADIONUCLIDES IN COLUMBIA RIVER WATER AND FISH, by R. F. Foster and Dan McConnon. Rept. on Contract AT(45-1)-1350. 6 Aug 62, 24p. 11 refs.

TID-15967 $6.60

Institute for Cancer Research, Boston, Mass.
BIOLOGICAL RESEARCH. Progress rept. no. 23, 1 Nov 61-30 Apr 62, on Contract AT(30-1)-901. 65p.

TID-16376 $1.10

Massachusetts General Hosp., Boston.
THE BIOLOGIC EFFECTS OF RADIATION ON THYROID TISSUE, by Oliver Cope. Annual progress rept, 15 Sep 61-14 Sep 62, on Contract AT(30-1)-667. 20 July 62, 9p.

NYO-10360 $1.10

McCollum-Pratt Inst., Johns Hopkins U., Baltimore, Md.
A STUDY OF THE EFFECT OF RADIATION ON BIOLUMINESCENT MATERIALS, by Howard H. Seliger and W. D. McElroy. Final rept. on Contract AT(30-1)-2189. 9 Aug 62, 9p.

TID-7639 $17.50

Radiobiology Lab., U. of Utah, Salt Lake City.
PLUTONIUM, RADIUM AND MESOTHORIUM, comp. by C. N. Stover, Jr. Quarterly rept. on Contract AT(11-1)-119. 30 June 54, 277p. Second Annual conference, June 17-19, 1954.

TID-16459 $6.60

Radiobiology Lab., U. of Utah, Salt Lake City.
SEMIANNUAL PROGRESS REPORT. Rept on Contract AT(11-1)-119. 30 Sep 56, 61p.

TID-16323 $1.60

Roscoe B. Jackson Memorial Lab., Bar Harbor, Maine.
QUANTITATIVE POPULATION GENETICS OF MICE UNDER IRRADIATION, by Earl L. Green and Thomas H. Roderick. Progress rept. 1 July 61-30 June 62, on Contract AT(30-1)-1979. 1 July 62, 19p.

TID-16524 $1.60

Sloan-Kettering Inst. for Cancer Research, New York.
THE DIRECT MEASUREMENT OF LOCAL ABSORVED DOSE PRODUCED BY RADIATION BEAMS IN TISSUE MATERIALS. Annual progress rept. 1 July 61-30 June 62, on Contract AT(30-1)-1451. 1 Aug 62, 10p. 1 ref.

TID-16395 $1.10

Sloan-Kettering Inst. for Cancer Research, New York.
A STUDY OF THE EFFECTS OF X-RAYS ON THE BONES OF LIVING MICE, by Helen Q. Woodard. Progress rept., 1 Oct 61-1 July 62, on Contract AT(30-1)-910. 20 July 62, 5p. 3 refs.

CHEMISTRY

IS-501 $3.60

Ames Lab., Iowa State U. of Science and Tech.
PREPARATION OF SODIUM ETHYLSULFATE, by John Craig Walker, E. H. Olson, and L. E. Burkhart. Rept. on Contract W-7405-eng-82. Feb 62, 40p.

TID-16350 $8.10

Arizona State U., Tempe.
THE SOLID STATE CHEMISTRY OF RARE EARTH OXIDES, by Leroy Eyring, Bo Holmberg and others. Technical progress rept. on Contract AT(11-1)-1109. 12 July 62, 84p. 11 refs.

TID-16711 $1.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
VIBRATIONAL SPECTRA OF INORGANIC COMPOUNDS, by Foil A. Miller. Annual progress rept. 1 Oct 61-1 Sep 62, on Contract AT(30-1)-1993. 1 Sep 62, 20p. 15 refs.

Analytical Chemistry

IS-504 $9.60

Ames Lab., Iowa State U. of Science and Tech.
ANALYSIS OF CARBON MONOXIDE-NITROGEN MIXTURES BY HIGH RESOLUTION MASS SPECTROMETRY, by Robert Joseph Conzemius and H. J. Svec. Rept. on Contract W-7405-eng-82. Feb 62, 117p. 14 refs.

IS-510 $3.60

Ames Lab., Iowa State U. of Science and Tech.
ANALYSIS OF MIXTURES OF ALCOHOLS BY ACYLATION, by William Dean Fellows and J. S. Fritz. Rept. on Contract W-7405-eng-52. 14 Aug 62, 38p. 11 refs.

TID-11956 $2.60

Argonne National Lab., Ill.
DIRECT QUANTITATIVE DETERMINATION OF RADIOACTIVITY ON PAPER CHROMATOGRAMS, by Sayed H. Hilal and Walter E. Kisieleski. 1 Jan 61, 24p. 17 refs.

BNL-5330 $2.60

Brookhaven National Lab., Upton, N.Y.
TRANSITION METAL COMPLEXES AND CHARGE-TRANSFER PROCESSES IN PYRIDINE. I. CHLORIDE AND THIOCYANATE COMPLEXES OF IRON IN PYRIDINE, by Donald G. Schweitzer and Henry Linschitz. Rept. on Contracts AT(30-1)-820 and Contract DA 36-039-sc-15533. [1961] 30p. 11 refs.

BNL-5331 $2.60

Brookhaven National Lab., Upton, N.Y.
TRANSITION METAL COMPLEXES AND CHARGE-TRANSFER PROCESSES IN PYRIDINE. II. THE FORMATION OF $HFeCl_4$ AND THE IONIZATION OF HCNS AND HCl IN PYRIDINE, by Donald G. Schweitzer and Henry Linschitz. Rept. on Contracts AT(30-1)-820 and DA 36-039-sc-15533. [1961] 23p. 14 refs.

TID-16564 $1.60

Michigan U., Ann Arbor.
LEWIS ACID-BASE TITRATION EMPLOYING MEGACYCLE-FREQUENCY OSCILLATORS. III. PREPARATION, ISOLATION AND CHARACTERIZATION OF SOME ADDUCTS PREDICTED FROM TITRATION CURVES, by Eldon T. Hitchcock and Philip J. Elving. Rept. no. 71 on Contract AT(11-1)-1148. 20 Aug 62, 18p. 20 refs.

ORNL-TM-366 $1.10

Oak Ridge National Lab., Tenn.
ORNL PROCEDURES FOR CONTROLLED-POTENTIAL COULOMETRIC TITRATION OF PLUTONIUM, by W. D. Shults. 14 Sep 62, 6p.

Organic Chemistry

TID-16585 $1.10

California U., Los Angeles.
CHELATION AND COORDINATION CHEMISTRY AS AN EXPLANATION OF FACTORS THAT INDUCE IRON CHLOROSIS IN PLANTS, by A. Wallace. Rept. on Contract AT(11-1)-34. 24 May 62, 9p. 8 refs.

TID-16224 $1.60

Ethyl Corp., Detroit, Mich.
THE SYNTHESIS OF ORGANOLANTHANIDE DERIVATIVES. Quarterly progress rept. no. 5 on Contract AT(11-1)-999. 15 May 62, 16p.

Physical Chemistry

TID-12048 $1.60

Argonne National Lab., Ill.
THE SYSTEM URANIUM-OXYGEN-SULFUR, by E. David Cater and Paul W. Gilles. Sep 60, 15p. 18 refs. ANL-6140.

K-1117 $1.60

[Oak Ridge Gaseous Diffusion Plant] Tenn.
CALCIUM FLUORIDE AS A SORBENT FOR HYDROGEN FLUORIDE, by W. L. Colvin. 21 May 54, declassified 29 June 62. 13p. 7 refs.

TID-16807 $7.60

Ohio State U. Research Foundation, Columbus.
KINETIC STUDY OF THE GASEOUS IODINE-FUSED SILVER NITRATE REACTION, by William Herbert Kirby. Technical rept. no. 1 on Contract AT(11-1)-750. [1962] 74p. 7 refs. RF proj. 939.

EARTH SCIENCES

PB 162 302 $12.50

Bege, J. R. M., Co., Arlington, Mass.
EFFECTS OF ATMOSPHERIC WATER VAPOUR ON NEAR INFRARED TRANSMISSION AT SEA LEVEL. PART I. TABULAR, GRAPHICAL AND ANALYTICAL REPRESENTATION OF WATER VAPOUR TRANSMISSION FROM 0.72 TO 15 MICRONS. PART II. THEORY AND ANALYSIS, by R. M. Langer. Rept. on Analysis and Computation of Atmospheric Transmission in the Near Infrared, Contract DA 36-039-sc-72351. May 57, rev. Nov 58, 176p. 10 refs. Rept. no. 1.1-57.43; AD-207 550, supersedes AD-161 077.

DESCRIPTORS: *Atmosphere, Moisture, Wave transmission, *Water vapor, *Infrared radiation, Spectrographic data, Equations, Theory, Analysis.

Water vapour transmission data from 0.72 to 15 μ are presented in terms of 8 windows. The underlying measured data are recorded and formulae for transmission coefficients are given. Numerical values for the parameters in these formulae are also given. Equations are used to compute energy from various black body sources transmitted through the eight windows for all paths from 0.1 to 1000 mm. of precipitable water vapour. (Author)

TID-16054 $1.60

Lamont Geological Observatory, Columbia U., Palisades, N. Y.
LAMONT SEA WATER RADIOCARBON PROGRAM, by Robert D. Gerard. Final rept. on Contract AT(30-1)-1808. Apr 62, 16p. 9 refs.

UCRL-6051 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
EFFECT OF LAYERING ABOVE A REFRACTOR ON THE CHARACTER OF THE REFRACTION ARRIVAL, by Glenn C. Werth. Rept. on Contract W-7405-eng-48. 20 Sep 60, 16p. 8 refs.

Geology

TID-16359 $2.60

Bingham Oceanographic Lab., Yale U., New Haven, Conn.
STRONTIUM, MAGNESIUM, AND MANGANESE IN FOSSIL FORAMINIFERAL CARBONATES, by Peter J. Wangersky and Oiva Joensuu. Rept. on Contract AT-(30-1)-2882. 1962, 21p. 10 refs. Prepared in cooperation with Marine Lab., U. of Miami.

BNL-5332 $1.10

Brookhaven National Lab., Upton, N. Y.
PRECAMBRIAN AGES IN THE WIND RIVER MOUNTAINS, WYOMING, by William A. Bassett and Bruno J. Giletti. [1961] 10p. 9 refs.

TID-16348 $9.60

Geochronology Labs., U. of Arizona, Tucson.
CORRELATION AND CHRONOLOGY OF ORE DEPOSITS AND VOLCANIC ROCKS, by Paul E. Damon. Annual progress rept. no. 4 on Contract AT(11-1)-689. 10 July 62, 114p. 16 refs.

UCRL-6306 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
A DIRECT METHOD FOR INVESTIGATING THE INTERIOR OF THE EARTH, by William Mansfield Adams. Rept. on Contract W-7405-eng-48. Feb 61, 13p. 11 refs.

TID-16781 $2.60

William Marsh Rice U., Houston, Tex.
GEOLOGIC ASPECTS OF THORIUM RECOVERY FROM COMMON ROCKS. Quarterly progress rept. 1 June-31 Aug 62. 25p. 4 refs.

Mineralogy

UCRL-6300 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
RATE OF THERMAL DEHYDRATION OF KAOLINITE IN VACUUM, by J. Birch Holt, Ivan B. Cutler, and Milton E. Wadsworth. Rept. on Contract W-7405-eng-48. 1 Feb 61, 17p. 9 refs.

TID-15718 $1.10

Massachusetts Inst. of Tech., Cambridge.
MINERAL ENGINEERING. Annual research rept., 1 Nov 61-31 Oct 62, on Contract AT(30-1)-956. 5p.

Physics of the Atmosphere

NASA N62-14689 $4.00

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
THEORETICAL MODELS FOR THE SOLAR-CYCLE VARIATION OF THE UPPER ATMOSPHERE, by Isadore Harris and Wolfgang Priester. Aug 62. 261p. 7 refs. Technical note D-1444

HW-SA-2137 $1.60

Hanford Atomic Products Operation, Richland, Wash.
DUAL ATMOSPHERIC TRACER TECHNIQUES FOR DIFFUSION STUDIES USING PHOSPHORESCENCE-FLUORESCENCE ANALYSIS, by J. D. Ludwick. Rept. on Contract AT(45-1)-1350. 20 Mar 61, 16p. 2 refs.

ENGINEERING

TID-16356 $7.60

Bureau of Mines, Bartlesville, Okla.
SALT DISPOSAL STUDY, PROJECT DRIBBLE, TATUM DOME AREA, LAMAR COUNTY, MISS, by C. H. Riggs, Larman J. Heath, and Don C. Ward. July 62, 60p.

PB 181 423 $3.50

Bureau of Yards and Docks, Washington, D. C.
CARPENTRY FORMULAS. Engineered Performance Standards, Public Works Maintenance. Sep 62, 241p. NAVDOCKS P-702.1, supersedes PB 139 128.

DESCRIPTORS: *Handbooks, Civil engineering, Construction, Milling machines, Operation, Furniture, Roofs, Floor coverings, Standards, Maintenance.

UCRL-6977 $4.60

Lawrence Radiation Lab., U. of California, Livermore.
SURFACE FINISH METROLOGY, James B. Bryan, George I. Boyadjieff, and Eldon R. McClure. Rept. on Contract W-7405-eng-48. 2 July 62, 43p. 25 refs.

Aeronautical Engineering

NASA N62-16512 $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
WIND-TUNNEL TESTS OF TWO FULL-SCALE HELICOPTER FUSELAGES, by James C. Biggers, John L. McCloud, III, and Pete Patterakis. Oct 62, 39p. 5 refs. NASA TN D-1548.

NASA N62-15764 $3.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
INFLUENCE OF TIRE TREAD PATTERN AND RUNWAY SURFACE CONDITION ON BRAKING FRICTION AND ROLLING RESISTANCE OF A MODERN AIRCRAFT TIRE, by Walter B. Horne and Trafford J. W. Leland. Sep 62, 193p. 15 refs. Technical note D-1376.

NASA N62-15422 $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LOW-SPEED LONGITUDINAL CHARACTERISTICS OF AN AIRPLANE CONFIGURATION INCLUDING EFFECTS OF CANARD AND WING TRAILING-EDGE FLAP CONTROLS IN COMBINATION, by Bernard Spencer, Jr. and William C. Sleeman, Jr. Sep 62, 49p. 8 refs. Technical note D-1397; supersedes NASA Memo 4-22-59L.

NASA N62-16779 $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va,
MEASURED SURFACE DEFECTS ON TYPICAL TRANSONIC AIRPLANES AND ANALYSIS OF THEIR DRAG CONTRIBUTION. by Elmer A. Horton and Neal Tetervin. Oct 62, 49p. 29 refs. NASA TN D-1024.

NASA N62-16698 $1.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
PANEL FLUTTER TESTS ON FULL-SCALE X-15 LOWER VERTICAL STABILIZER AT MACH NUMBER OF 3.0, by Herman L. Bohon. Oct 62, 61p. 6 refs. NASA TN D-1385.

NASA N62-16100 $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
VTOL HEIGHT-CONTROL REQUIREMENTS IN HOVERING AS DETERMINED FROM MOTION SIMULATOR STUDY, John F. Garren, Jr. and Arthur Assadourian. Oct 62, 15p. 4 refs. NASA TN D-1488.

Chemical Engineering

ARF-3187-8 $2.60

Armour Research Foundation, Chicago, Ill.
ELECTROSTATIC CLASSIFICATION OF SUBMICRON AIRBORNE PARTICLES, by G. Langer. Progress rept. 1 June-1 Aug 62, on Contract AF(11-1)-578. 25p.

HW-SA-1911 $1.60

Hanford Atomic Products Operation, Richland, Wash.
HIGH FLOW RATE OPERATION OF A DUPLEX ION EXCHANGE SYSTEM. [1960] 12p. 4 refs.

HW-SA-2569 $5.60

Idaho U., Moscow.
A STUDY OF THE MASS TRANSFER CHARACTERISTICS OF A FLUIDIZED-BED ION-EXCHANGE COLUMN, by Gilbert Allen Nicholson. Master's thesis. Rept. on Contract AT(45-1)-1350. 27 July 62, 54p. 9 refs.

TID-16496 $1.60

Minnesota U., Minneapolis.
EXPERIMENTAL DETERMINATION OF AIR-WATER FLOW CHARACTERISTICS IN THE VENT TUBE. Bimonthly rept. no. 13, 1 June-31 July 62. 11 Aug 62, 6p.

Electrical and Electronic Engineering

PB 162 316-1 $9.10

Aeronautical Radio, Inc., Washington, D. C.
INVESTIGATION OF ELECTRON TUBE RELIABILITY IN MILITARY APPLICATIONS. General rept. no. 1, 4 Apr 51-1 Mar 53, on Contract NObsr-43272. 4 Jan 54, 106p. 14 refs. [Rept. no. 32]; AD-42 082.

DESCRIPTORS: *Electron tubes, *Reliability, *Electronic equipment, Failure (Mechanics), Military requirements.

Data are presented on the reliability of electron tubes collected from 8 military bases. The tubes are divided into 4 broad classifications according to defect findings: electrical, mechanical, miscellaneous, and those in which no defect was found. In assigning causes for the occurrence of each of these categories of return, and in examining each base and the reasons for its difference from other bases, several general conclusions are reached. The most important of these conclusions is that, in general, 1 out of every 3 tubes removed does not appear to be defective. The reason for this waste of good tubes under present-day maintenance practice is that the complexity of modern electronic equipment is not always accompanied by ease of operation and servicing. The status of maintenance and operating procedures is summarized in order to define the requirements in equipment and tube design. Require-

ments in equipment design are for greater simplicity in operating procedures and fundamental changes in design giving primary consideration to methods of detecting and correcting malfunctions, in order that enlisted personnel with 6 months training may successfully operate and service electronic equipment. Requirements in tube design are for limitation of dissipation; limitation of operating temperatures to values giving longest life through reduction in cathode poisoning, interface formation, and leakage production by evaporation; and control of parts dimensions and processing in a way that limits to a minimum the tube failures due to faulty workmanship.

PB 162 338 $5.60

Airborne Instruments Lab., Deer Park, N. Y.
APPLICATION OF SEMICONDUCTOR DIODES TO LOW-NOISE AMPLIFIERS, HARMONIC GENERATORS, AND FAST-ACTING TR SWITCHES, by J. C. Greene, F. G. Haneman and others. Quarterly progress rept. no. 8 on Contract AF 30(602)1854. June 60, 53p. 9 refs. Rept. no. 4589-I-8; RADC-TN-60-134; AD-240 131.

DESCRIPTORS: *Semiconductors, *Diodes, *Microwave amplifiers, *Frequency multipliers, *Transmitter receivers, Switching circuits, C band, L band, Electronic switches.

The technique of using a pair of one-port reactance amplifiers connected to a 90-degree hybrid network to obtain a widely tunable amplifier with optimum noise and gain-bandwidth performance has been analyzed theoretically. It is shown that the advantage of wide tunability tends to be counteracted by the requirement for well-matched loading impedances to simultaneously avoid (1) oscillation, (2) radiation of signal power from the input port, and (3) a large degradation in the minimum achievable noise temperature. Further modifications and measurements were made on the C-band degenerate amplifier. By modifying the pump coupling network, a nearly constant source impedance was obtained over an 800-Mc bandwidth, resulting in a measured total gain-bandwidth product of 950 Mc. This total gain-bandwidth product, which included both signal and idler responses, was then increased to 1200 Mc by replacing the single-tuned input circuit with a double-tuned input circuit.

PB 162 266-2 $2.60

American Research and Mfg. Corp. [Rockville] Md.
RAPID RESPONSE MAGNETIC AMPLIFIERS, by Peter H. Sawitz. Scientific rept. no. 2, 15 Apr-14 July 56, on Contract AF 33(616)3377. [1956] 26p. AD-103 402.

DESCRIPTORS: *Magnetic amplifiers, Amplifiers, Design, High frequency, Power supplies, Silicon, Diodes, Tests.

Improved designs are described of a 400 c. p. s. frequency doubler, several 800 c. p. s., 2. 4 KC, and 7. 2 KC triplers, a 50 KC transistor multivibrator, and a high-frequency rapid response magnetic amplifier. Experimental data are presented on the doubler and the triplers, singly and operating in cascade. Some data were also obtained on the transistor multivibrator and the rapid response magnetic amplifier. A program of testing various types of silicon diodes for their suitability for use in high-frequency magnetic amplifiers was initiated. (Author)

PB 162 266-3 $3. 60

American Research and Mfg. Corp., Rockville, Md.
RAPID RESPONSE MAGNETIC AMPLIFIERS, by Peter H. Sawitz. Scientific rept. no. 3, 15 July-14 Oct 56, on Contract AF 33(616)3377. [1956] 32p. AD-113 975.

DESCRIPTORS: *Magnetic amplifiers, Amplifiers, Design, High frequency, Power supplies, Tests.

A design is presented of a three-phase 15-tupler, which shows great promise as a first stage in a cascaded power supply. This is presented as an alternate approach to the high-frequency power supply problem. The development of the five-stage power supply was completed. Satisfactory operation was obtained with a power output of about 5 watts. Experimental data are presented on the development of the transistor-multivibrator power supply and of the high-frequency magnetic amplifiers. Experimentation with these two items is continuing. A series of pictures of wave forms is presented showing the characteristics of several diodes operated at various frequencies. (Author)
(See also PB 162 266-2)

AD-260 647 $4. 60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
A VERY-FAST, VOLTAGE-CONTROLLED, MICROWAVE PHASE-SHIFTER, by H. N. Dawirs and W. G. Swarner. Rept. on Research on Electronic Reconnaissance Antennas, Contract AF 33(616)6211. 1 Mar 61, 50p. Rept. no. 903-19; AD-260 647.

DESCRIPTORS: *Phase shifters, Microwave equipment, Transmission lines, Variable capacitors, Impedance, Electronic circuits, Design, Diodes, *Coaxial cables, Capacitors, Admittance, Mathematical analysis.

A phase-shifter is described which consists of three variable capacitors spaced uniformly along a transmission line. A rigorous analysis shows that the phase-shift can be controlled by means of the end capacitors while the characteristic impedance of the network is maintained constant by adjustment of the middle capacitor. Simple and practical design relations are divided from the results of this analysis. It is shown that a very-fast, low-loss, hysteresis-free, voltage-controlled phase-shifter results when back-biased diodes, or varactors, are used as voltage controlled capacitances. A number of examples are presented to illustrate possible designs and design procedures. (Author)

PB 162 335 $3. 60

Bell Telephone Labs., Inc., New York.
IMPROVED CRYSTAL RECTIFIERS. Interim rept. no. 1, 1 Jan-31 Mar 57, on Contract DA 36-039-sc-73224. 15 May 57, 32p. 3 refs; AD-139 384.

DESCRIPTORS: *Crystal rectifiers, *Capacitors, *Diodes, *Germanium, *Silicon, Diffusion, Frequency converters, Variable resistors, Microwave equipment.

Diffused Si and Ge nonlinear-capacitor diodes are being fabricated with various starting resistivities, diffusion depths, and areas to determine optimum structures for low-noise amplifying frequency converters for microwave receivers. Design information for high-level modulators is also expected to result from this investigation. An analysis for the variable capacitor p-n diode with parasitics as an upper-sideband frequency converter indicates the product of the series resistance (R_s) and minimum capacitance (C_{min}) should be as small as possible. A study of the gain of the nonlinear-capacitor un-converter with resistive terminations shows that conversion gain can be obtained even when no reactive elements are used to tune the input and output. Nonlinear capacitors with a cutoff frequency ($f_c = 1/2\pi R_s C_{min}$) of 40 kmc were made by the diffusion of impurities into Se or Ge. Si resistivities as low as 0.0015 ohm-cm were successfully used. Out diffusion experiments were made on Ge. Point contact diodes made on heat treated material (Sb-doped n-type Ge) showed improved dc reverse characteristics.

PB 162 336 $2.60

Bell Telephone Labs., Inc., New York.
MICROWAVE SOLID-STATE DEVICES. Interim rept. no. 6, 1 Apr-30 June 58, on Contract DA 36-039-sc-73224. 15 Aug 58, 30p. 11 refs.

DESCRIPTORS: *Masers, *Microwave equipment, *Microwave amplifiers, Amplifiers, Microwave networks, Diodes, Silicon, Ruby, Gadolinium compounds, Sulfates, Ethyl radicals, Solid state physics, Design.

The exploratory program covering the study of materials, development of microwave structures, and the construction and evaluation of performance of complete devices has continued. Short (1 to 2 inch) model sections of slow-wave masers have been constructed and operated. Gains of 4.5 db/cm for gadolinium in lanthanum ethyl sulphate and 2.8 db/cm for ruby over an electronically tunable bandwidth of 300 mc have been obtained. Low-noise microwave amplification and efficient harmonic generation by diffused silicon diodes have been demonstrated experimentally. Exploratory work is reported on a "dimple" diode structure which is electrically similar to the low-noise amplifying diodes but is expected to have higher power-handling ability.

PB 162 337 $3.60

Bell Telephone Labs., Inc., New York.
MICROWAVE SOLID-STATE DEVICES. Interim rept. no. 9, 1 Jan-31 Mar 59, on Contract DA 36-039-sc-73224. 15 May 59, 39p. 12 refs.

DESCRIPTORS: *Masers, *Microwave equipment, *Microwave amplifiers, Amplifiers, Silicon, Diodes, Frequency multipliers, Broadband, Ultra high frequency, Ruby, Garnet, Solid state physics, Design.

The line width, relative peak absorption, and relaxation times of ruby have been measured as a function of concentration. This measurement yields the information required to optimize the gain bandwidth product of a ruby maser with respect to the spin concentration. A summary of design considerations for graded junction mesa varactor diodes is presented. A discussion of preliminary experimental results using mesa diodes as nonlinear capacitors for harmonic generation is presented. (See also PB 149 720)

PB 162 293 $7.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
RESEARCH LEADING TO THE DEVELOPMENT OF A SHIELDING EFFECTIVENESS TESTER, by Edward R. Schatz, Maurice E. Taylor and others. Quarterly progress rept. no. 1, 15 June-15 Sep 56, on Contract DA 36-039-sc-72308. [1956] 77p. AD-126 019.

DESCRIPTORS: *Electromagnetic shielding, Materials, Test equipment, Design.

PB 162 294 $3.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
RESEARCH LEADING TO THE DEVEOPMENT OF A SHIELDING EFFECTIVENESS TESTER, by Edward R. Schatz and Robert Robl. Quarterly progress rept. no. 2, 15 Sep-15 Dec 56, on Contract DA 36-039-sc-72308. [1956] 38p. AD-126 020.

DESCRIPTORS: *Electromagnetic shielding, Materials, Test equipment, Design.

See also PB 162 293

PB 162 295 $2.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
RESEARCH LEADING TO THE DEVEOPMENT OF A SHIELDING EFFECTIVENESS TESTER, by Edward R. Schatz, Maurice E. Taylor, and Robert Shields. Quarterly progress rept. no. 4, 15 Mar-15 June 57, on Contract DA 36-039-sc-72308. [1957] 27p. AD-155 260.

DESCRIPTORS: *Electromagnetic shielding, Materials, Test equipment, Design.

Leakage data were obtained for a variety of cables by using the triaxial shielding-effectiveness tester. Data for 32 cable samples are presented. For a small-diameter single-braid (RG-29) cable, leakage increased from 60 c to 400 kc, decreased slightly from 400 kc to 17.2 mc, and increased sharply from 17.2 to 44.6 mc. The general trend was an increase in leakage with frequency. Double-braided cables showed lower leakage than single-braids, especially at higher frequencies. The triaxial tester offered a simple method of testing the effectiveness of braided cables. (See also PB 162 294)

PB 162 296 $5.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
RESEARCH LEADING TO THE DEVELOPMENT OF A SHIELDING EFFECTIVENESS TESTER, by Edward R. Schatz and Robert Robl. Quarterly progress rept. no. 5, 15 June-15 Sep 57, on Contract DA 36-039-sc-72308. [1957] 57p. AD-155 259.

DESCRIPTORS: *Electromagnetic shielding, Materials, Test equipment, Design.

The use of the leaky coaxial cable as a radiating antenna was studied. Experimental work performed with the shorted coaxial cable used as a monopole antenna is described. Study indicated that a shorted coaxial cable can be approximated with respect to field distribution by a wire with a current distribution the same as that of the inner conductor of the cable but reduced by some factor (shielding effectiveness factor). This factor can be found for certain cables by experimental measurements and analytical work with the monopole antenna configuration. The factor can be compared with measurements by using the cylindrical tester. These comparisons can serve to calibrate the cylindrical tester. (See also PB 162 295)

PB 162 297 $2.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
RESEARCH LEADING TO THE DEVELOPMENT OF A SHIELDING EFFECTIVENESS TESTER, by Edward R. Schatz, Robert F. Robl and others. Quarterly progress rept. no. 6, 15 Sep-15 Dec 57, on Contract DA 36-039-sc-72308. [1957] 30p. AD-157 558.

DESCRIPTORS: *Electromagnetic shielding, Materials, Test equipment, Design.

Equipment and methods are being developed for evaluating the effectiveness of shielding materials which are used to reduce electromagnetic radiation from circuits carrying RF currents. Leakage data are presented for coaxial cable connectors as obtained through use of cylindrical testers. (See also PB 162 296)

PB 162 298 $12.00

Carnegie Inst. of Tech., Pittsburgh, Pa.
RESEARCH LEADING TO THE DEVELOPMENT OF A SHIELDING EFFECTIVENESS TESTER, by Edward R. Schatz, Robert F. Robl and others. Final rept. 15 June 56-15 June 58, on Contract DA 36-039-sc-72308. [1958] 165p. AD-213 322.

DESCRIPTORS: *Electromagnetic shielding, Materials, Test equipment, Design.

(See also PB 162 297)

PB 162 319 $8.10

Coordinated Science Lab., U. of Illinois, Urbana.
THE IDENTIFICATION OF LINEAR PROCESSES BY MEANS OF CORRELATING FILTERS, by W. W. Lichtenberger. Rept. on Contract DA 36-039-sc-85122. Dec 60, 90p. 29 refs. Rept. R-122; AD-249 454.

DESCRIPTORS: Identification, *Electric filters, Control systems, Mathematical analysis, Noise, *Correlation techniques, Sensitivity.

A method of determining the impulse response of a linear system with a correlating filter is applied to process identification for adaptive control. To reduce the noise at the output of the filter, a method is proposed in which a number of tests are made in succession and the results of the tests are added together by a recirculating delay line or similar device. Optimum design of the correlating filter and a test signal necessary in the scheme are determined on the basis of minimum mean-square error of the estimate. The general results are applied to two examples. First a known, slowly time-varying process is measured. Optimum design is given for this case, and curves showing the optimum number of tests for a special mode of time variation are included. Second the problem of measuring a member of an ensemble of fixed processes is treated. Another method of reducing output noise makes use of a constantly revised reference model. It is shown that this method is usually superior to the coherent integration scheme, but that the reference model does not always converge to the correct state. Finally extensions to the multi-input, multi-output case together with some attendant complications are discussed. (Author)

PB 162 311 $11.00

Electronics Research Lab., Stanford U., Calif.
BACKWARD-WAVE INTERACTION IN HELIX-TYPE TUBES, by Ward Harman. Technical rept. no. 13 on Contract Nonr-225(10). 26 Apr 54, 148p. 33 refs. AD-31 480.

DESCRIPTORS: *Traveling wave tubes, Helixes, *Backward-wave oscillators, Oscillators, Operation, Oscillation, Theory, Design, Mathematical analysis.

PB 162 339 $11.50

General Electric Research Lab., Schenectady, N.Y.
CW MAGNETRON RESEARCH ON VOLTAGE-TUNABLE MAGNETRONS, by D. A. Wilbur, P. H. Peters, Jr., and R. E. Turrentine. Final rept. for 1 May 53-31 Dec 56, on Contract DA 36-039-sc-42699, continuation of Contracts DA 36-039-sc-32279 and DA 36-039-sc-5556. [1957] 155p. 9 refs. Rept. no. 57-RL-1745, Part I; AD-135 098.

DESCRIPTORS: *Magnetrons, Design, Tuning devices, Voltage, Control systems, Circuits, *Electron tubes, Cathodes (Electron tubes), Anodes (Electron tubes), Electron beams.

A physical picture is developed which affords a qualitative explanation of the voltage-tuning phenomenon. The facts which determine the operating point at each voltage are described. The operation of the voltage-tuned magnetron (VTM) was improved by the addition of an electrode which controls the amount of beam current injected into the interaction space. This controlled injection tends to keep the output power constant, minimizes the effect of backheating, and permits the use of any space-charge limited emitter. This makes possible a reduction in frequency sensitivity to changes

in filament current. This was demonstrated by replacing the directly heated emitters with indirectly heated oxide cathodes. RF circuits were developed for use with the ceramic seal VTM which permit voltage tuning of these tubes over a 2:1 frequency range at the one-watt level. Extremely wide-band voltage tuning was achieved at low power. Tuning ranges of 20 to 1 in ratio were demonstrated with output powers of the order of 10 mw or more and of 6 to 1 in ratio at the quarter watt output level.

PB 162 312 $4.60

Hamilton Standard Div., United Aircraft Corp., Broad Brook, Conn.
DEVELOPMENT PROGRAM FOR MODULAR INTERCONNECTIONS FOR MICRO-ASSEMBLIES, by Robert H. Homstead. Quarterly progress rept. no. 2, 30 Sep-30 Dec 60, on Contract DA 36-039-sc-85347. [1961] 46p. Rept. no. HSER 2303; AD-252 020.

DESCRIPTORS: *Miniature electronic equipment, *Electric connectors, Materials, *Welding, Electron beams, Welded joints, Electrical properties, Tensile properties, Manufacturing methods, Design.

A 6 position fixture was made for welding wafers at one setup. A mold was made to pot wafers in stacks of four. A fixture for welding riser wires to the stacked wafers on a 25 mil grid was constructed. A fixture was designed and built for the vibration test. A fixture for resistance measurements and pull testing was designed and constructed. Over 200 riser wires were electron beam welded to metallized alumina wafers in order to optimize machine parameters and establish testing methods. A technique for continuous-seam electron beam welding of each joint area was developed. Pull tests were made with both wires in tensile. Other tests were made with the weld nugget in shear. The shear test method is shown to be a more reliable procedure. The electrical resistance of all welded joints was measured. A dc resistance method was used and all visually acceptable welds had a measured resistance within the requirement of SCL-7553. (Author)

PB 162 307 $7.60

Harshaw Chemical Co., Cleveland, Ohio.
PHOTOVOLTIAC CADMIUM SULFIDE, by Fred A. Shirland. Rept. for Mar 58-May 60, on Solar and New Energy Conversion, Contract AF 33(616)3466. Aug 60, 80p. 7 refs. ARL Technical rept. 60-293; AD-246 547.

DESCRIPTORS: *Photoelectric cells, *Solar energy, *Cadmium conpounds, *Sulfides, Effectiveness, Impurities, Crystals, Growth, Indium compounds, Chlorides, Sintering, Production, Power supplies, Temperature.

Procedures have been developed, enabling photovoltaic cells and batteries of approximately 5% conversion efficiency to be fabricated from CdS. The process uses a commercial grade of CdS raw material, adds .003 weight per cent of InC13 as dopant, sinters the material in vacuum and in nitrogen at temperatures up to 900 degrees C, and grows large grained polycrystalline ingots from the vapor phase at 1260 degrees C. Rhodium collector electrodes are formed on the back surface by electrodepositing finely divided copper, oxidizing to the Cu2O state, and heat treating at temperatures of 350 degrees C for 10 to 30 seconds. The barrier surface is then contacted with silver paint. Temperature performance, I-V characteristic curves, and spectral response measurements have been taken on these cells, and various measures of the stability and the nature of the barrier in these cells have been made. It is evident that the barrier in the CdS cell is distinctly different from that in other known photovoltaic cells such as silicon, germanium, selenium, or gallium arsenide. Lacking an understanding of the fundamental nature of the barrier in the CdS cell it has not been possible to predict the upper limit of conversion efficiency possible under solar or other types of illumination. (Author)

PB 162 303 $4.60

Hughes Aircraft Co., Culver City, Calif.
DEVELOPMENT OF NARROW-BAND BANDPASS FILTERS WITH CENTER FREQUENCIES IN THE RANGE OF 10 - 60 mc, by Leo Storch. Quarterly progress rept. no. 3, 1 Apr-30 June 57, on High Frequency Crystal Filters, Contract DA 36-039-sc-73070. [1957] 48p. 12 refs. Rept. no. 73070-3-Q; AD-142 728.

DESCRIPTORS: *Band-pass filters, *Crystal filters, High frequency filters, Design, Electrical properties, Coils, Capacitors.

Recent design trends, motivated by test results obtained on a Type NB pilot filter with a center frequency of 1.75 mc, are described. The completely satisfactory, measured attenuation curve of a "modified Type NB" crystal filter is given. This filter possesses a center frequency of 11.5 mc, a 6 db bandwidth of 40 kc, more than 60 db discrimination, and a 60/6 db shape factor of 1.8:1. A design theory for ladder crystal filters is presented and two prototype designs are described. A filter approximating Gaussian amplitude and linear phase characteristics has been synthesized and its schematic diagram is included in the report. It has been designed for a 3 db bandwidth of 800 kc with respect to a center frequency of 10 mc and for construction by means of coils and capacitors, the Q's of which need not exceed 50. (Author) (See also PB 146 564)

PB 162 318-1 $12.00

Institute of Tech., U. of Minnesota, Minneapolis.
STUDY OF NOISE IN SEMICONDUCTORS AND SEMICONDUCTOR DEVICES, VOLUME I, by A. van der Zeil. Final rept. 1 June 58-30 June 60, on Contract DA 36-039-sc-78009. [1960] 169p. 7 refs. AD-246 897.

DESCRIPTORS: *Semiconductors, *Noise (Radio), Germanium, Crystals, *Diodes, *Transistors, Measurement, Theory, Silicon, Materials, Tellurium, Photoconductivity.

Measurements and techniques were described concern- noise of germanium crystals in the region of impact

ionization at 4° K. It was shown that the noise and oscillations that occurred at some currents depend strongly on the nature of the contacts. Some equipment improvement for the measurements of g-r noise at low temperatures was reported. Some measurements are given on gold-manganese and nickel-doped germanium samples. Several new aspects of the theory of g-r noise are dealt with. A careful statistical analysis of noise in gain-loss processes was given. Some new measurements were given for avalanche breakdown noise in silicon p-n-junctions. Some preliminary noise curves for tunnel diodes were given for the region 10 c to 100 kc. The equivalence of the collective and the corpuscular theories is discussed. A theory of shot noise in avalanche transistors is presented. The experimental accuracy of transistor noise measurements was improved. Transistor noise measurements at liquid nitrogen temperature are presented. The design theory of low-noise transistor circuits and of low-noise transistors is discussed. A two-stage noise figure of 6 db and a bandwidth of 50 mc is described. (Author)

PB 162 318-2 $4.60

Institute of Tech., U. of Minnesota, Minneapolis.
STUDY OF NOISE IN SEMICONDUCTORS AND SEMICONDUCTOR DEVICES, VOLUME II. Final rept. 1 June 58-30 June 60, on Contract DA 36-039-sc-78009. [1960] 46p. AD-246 898.

DESCRIPTORS: *Semiconductors, Germanium, *Diodes, Silicon, *Transistors, Materials, Circuits, *Noise (Radio), Photomultipliers, Photoconductivity.

(See also PB 162 318-1)

UCRL-6012-T $1.60

Lawrence Radiation Lab., U. of California, Livermore.
AVALANCHE TRANSISTOR SWITCHING. 6 May 60, 11p.

UCRL-5858 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
IMAGE CONVERTER TUBES-MANUFACTURER'S DATA, by F. K. Inami. Rept. on Contract W-7405-eng-48. Feb 60, 11p.

PB 162 315 $4.60

Material Lab., New York Naval Shipyard, Brooklyn.
INVESTIGATION OF THE APPLICATION OF MIXER CRYSTALS IN BALANCED MIXERS, by Paul Giordano and Jesse Taub. Final rept. 24 Dec 53, 43p. 6 refs. Lab. Project 5032-C-21.1; AD-44 282.

DESCRIPTORS: *Crystal mixers, Microwaves, Military requirement, Interference, Oscillators, Noise (Radar), Measurement, Reduction, Suppressors

A method for accurately measuring local oscillator noise suppression of microwave mixer crystals in a balanced mixer was developed. The interrelationship between the magnitudes of specific parameters of crystal pairs and local oscillator noise suppression was calculated theoretically and verified experimentally. Based on a study of present day receiver design, noise output characteristics of klystron local oscillator tubes, and experimental results, a realistic specification for 'matched' crystal pairs was formulated. (Author)

PB 162 274 $1.60

Merck and Co., Inc., Rahway, N. J.
STRUCTURAL INVESTIGATIONS IN THERMOELECTRIC MATERIALS, by P. I. Pollak, J. B. Conn and others. Progress rept. no. 2, 1 Aug-30 Sep 60, on Contract NObs-78503. [1960] 15p. AD-245 892.

DESCRIPTORS: *Thermoelectricity, Tellurides, Selenides, Bismuth alloys, Antimony alloys, *Semiconductors, *Electric power production, Resistance, Electrical conductance, Lattices, X-ray diffraction analysis, Selenium alloys, Tellurium alloys, Crystal structure.

Work on the thermoelectric alloy system, $BI_2SB_6O + xSE_6TE_{150-x}$, is continuing. Methods of preparation involving Bridgman and zone refining techniques are described. The thermoelectric properties of alloys were x varies from -8 to + 12 are presented. These data show that an optimum figure of merit may be obtained in a region where x is equal to 8. The quaternary composition with x equal to 8 was investigated, and experimental information shows that optimum properties can be obtained in zone-levelled samples. Figures of merit in excess of .004/deg K were calculated from the pertinent thermoelectric parameters. Compositional changes in the alloy involving the ratio of selenium to tellurium, the replacement of bismuth by antimony, and the replacement of antimony by tin and arsenic were investigated. Some of these changes led to interesting thermoelectric materials. Hall measurements were carried out on some alloy compositions, and a mobility of 320 sq cm/volt-sec. was found at room temperatures for the alloy composition. Replacing antimony by arsenide afforded an n-type materials. (Author)

PB 162 304 $15.00

Microwave Associates, Inc. [Burlington] Mass.
BASIC DESIGN CRITERIA FOR CIRCULAR WAVEGUIDE COMPONENTS, by D. A. Lanciani. Final rept. Feb 51-Jan 54, on Contract DA 36-039-sc-5518. Mar 54, 223p. 22 refs. AD-23 004.

DESCRIPTORS: *Waveguides, Design, Microwaves, Wave transmission.

Reported progress in the field of low-loss transmission is reviewed, and the minimal practical sizes for TE_{01}- mode circular wave guides are recommended. Experimental work on component development was conducted in the region from 8.2 to 40 kmc. The final-design transition employs a compact end-feed arrangement which contains 4 resonant slots; the basic design and scaled versions compare favorably

with the 6%-band-width requirement. The final-design mode absorber employs a new form of construction which maintains precise alignment of a lossy-gap structure in circular wave guides; the absorber exhibited both an intrinsic mode purity and average mode purity improvement factor for all spurious modes. The final-design bend is based on a mode-transformation method which avoids the TE_{01}-TM_{11}-mode degeneration problem. The bend consists of a superimposed pair of E- and H-plane rectangular waveguide bends which taper directly into TE_{01}-mode circular wave guide. Results of bend tests were satisfactory; a bending radius of less than 1 ft was attained at 8.2 kmc, the lowest frequency of interest, and the 35-kmc bend radius was about 3 inches.

PB 162 334 $4.60

Sprague Electric Co., North Adams, Mass.
DEVELOPMENT OF STABLE CERAMIC CAPACITORS, HI-K, by T. Prokopowicz. Quarterly progress rept. no. 3, 15 June-15 Sep 60, on Contract DA 36-039-sc-78318. [1960] 46p. 8 refs. AD-245 841.

DESCRIPTORS: *Ceramic capacitors, Capacitors, *Barium compounds, *Titanates, Additives, Ceramic materials, *Sodium compounds, Oxides, Niobates, Temperature, Dielectric properties.

First-phase studies continued with the study of various ratios of Na_2O/Nb_2O_5 additions to the basic material chosen for study, a fine-grained $BaTiO_3$ ceramic. It was determined that temperature stability of capacitance for $NaNbO_3$ additions does not depend critically on sodium content. Formulations whose capacitance variation with temperature is -15% to+10% are reported in the K range 2000 - 2500. $KNbO_3$ may be used as a substitute for $NaNbO_3$ in temperature-stable capacitors, although advantages are not evident. The successful development of Monolythic samples from $NaNbO_3$-containing $BaTiO_3$ probably depends on overcoming difficulties in the process leading to mechanical faults in the samples. There is inconclusive evidence that the dielectric constant of pure $BaTiO_3$ ceramics decreases as the grain size is reduced below one micron. (Author)

PB 162 265-1 $4.60

Sprague Electric Co., North Adams, Mass.
IMPROVEMENT OF POLARIZED ALUMINUM ELECTROLYTIC CAPACITORS, by Elmer Hunt. Quarterly rept. no. 1, 1 Mar-31 May 56, on Contract DA 36-039-sc-71186. 19 Sep 56, 47p. AD-110 969.

DESCRIPTORS: *Aluminum, Polarization, *Electrolytic capacitors, Capacitors, Electrolytes, Resistance, Design, Temperature, Operation, Power, Impedance, Measurement, Aging.

Improved characteristics of polarized aluminum electrolytic capacitors are sought, with special effort on increase of operating and shelf life, decrease in leakage currents, decrease of power factor, and improvement in low-temperature characteristics. Lowered resistance, necessary for improved low-temperature capacitor performance, was obtained for electrolytes based on glycol-borate solutions; the standard electrolyte, currently used in JAN-C-62 Characteristic C capacitors, was used as a control. Equipment is being set up for capacitance, resistance, and impedance measurements over the -55° to 85°C range. Test results indicate that even at -40°C, a temperature tolerance of ±1°C could make a difference of as much as 30% in the impedance values of capacitors employing conventional electrolytes. The measuring equipment currently being used does not have a greater over-all temperature-control accuracy; -55°C measurements have significance only in comparative measurements. Paper spacer materials were selected whose high porosity suggests better low-temperature properties when combined with electrolytes than are available with standard separators. A molded phenolic terminal cover was designed; the assembly consists of an axial lead-tinned copper wire embedded in a compression molded plastic which may be crimped or spun into a 5/8-in. -diam can by using a rubber sealing ring. All necessary capacitance values can be fulfilled with this housing.

PB 162 265-2 $5.60

Sprague Electric Co., North Adams, Mass.
IMPROVEMENT OF POLARIZED ALUMINUM ELECTROLYTIC CAPACITORS, by Elmer Hunt. Quarterly rept. no. 2, 1 June-31 Aug 56, on Contract DA 36-039-sc-71186. 21 Jan 57, 59p. AD-124 770.

DESCRIPTORS: *Electrolytic capacitors, Design, Polarization, Aluminum, *Electrolytes, Storage temperature, Electrical properties.

The objective of this development is to improve the characteristics of polarized aluminum electrolytic capacitors with special effort on (a) increase of operating and shelf life, (b) decrease in leakage currents, (c) decrease of power factor and (d) improvement in low temperature characteristics. Capacitor sections were constructed and temperature coefficient measurements made. Life tests and shelf tests are in progress to determine the adequacy of these electrolytes, especially with regard to reliability for high temperature service. (See also PB 162 265-1)

PB 162 265-3 $5.60

Sprague Electric Co., North Adams, Mass.
IMPROVEMENT OF POLARIZED ALUMINUM ELECTROLYTIC CAPACITORS. Quarterly rept. no. 3, 1 Sep-30 Nov 56, on Contract DA 36-039-sc-71186. [1956] 58p. AD-138 404.

DESCRIPTORS: *Electrolytic capacitors, Design, Polarization, Aluminum, *Electrolytes, Aging, Storage, Electrical properties.

Improved characteristics of polarized aluminum electrolytic capacitors are sought, with special effort on increase of operating and shelf life, decrease in leakage currents, decrease of pf, and improvement in low temperature characteristics. Test results showed that the temperature coefficient of capacity, specifically the characteristics at -55°C, of the experimental electrolyte samples were far superior to those of conventional electrolytes. The shelf and life test charac-

teristics were, in varying degrees, inferior to the conventional types. The first pilot run of molded terminal covers showed the covers to be unsatisfactory; the mold is being reworked for obtaining covers with higher purity inserts. The viscosity of the experimental electrolytes was sufficiently low to minimize any improvement in low temperature properties by using more porous spacers; this work was discontinued. (See also PB 162 265-2)

PB 162 265-4 $4.60

Sprague Electric Co., North Adams, Mass.
IMPROVEMENT OF POLARIZED ALUMINUM ELECTROLYTIC CAPACITORS. Quarterly rept. no. 4, 1 Dec 56-29 Feb 57, on Contract DA 36-039-sc-71186. [1957] 48p. AD-141 539.

DESCRIPTORS: *Electrolytic capacitors, Design, Polarization, Aluminum, *Electrolytes, Aging, Storage, Electrical properties.

Major emphasis continued on the study of electrolytes to obtain sufficient data to permit selection of electrolytes for final models. In addition to extensive life and shelf testing of earlier experimental electrolytes, nineteen new formulas were prepared and evaluated in capacitors. Two of these, containing ethanol as well as glycol, show promise. The addition of aluminum oxide to the electrolytes was studied to determine if capacitor anodes in contact with electrolyte would have better stability. No improvement in shelf life was noted. Modified molded 5/8" diameter covers with high purity inserts were received at the close of the period and did not exhibit leaking, even at 110°C for a two hour period, when sealed into the can with the rubber gasket. A study of the distribution of leakage current in finished capacitors yielded the following results:

Element	% Contribution to Leakage Current
Anode	5%
Stitching	30%
Anode Terminal Rivet	65%

The anode terminal rivet will be protected in final samples to minimize this effect (Author) (See also PB 162 265-3)

PB 162 305 $8.10

Wisconsin U., Madison.
SURFACE WAVE AND ANTENNA ENGINEERING RESEARCH STUDY, by Elmer H. Scheibe. Final rept. for 1 May 58-31 Aug 59, on Surface Waves, Antennas, and Microwave Circuits, Contract DA 36-039-sc-77990. 30 Sep 59, 82p. 12 refs. AD-228 769.

DESCRIPTORS: *Communication equipment *Antennas, *Microwaves, Propagation, *Microwave networks, Radiofrequency filters, Transmission lines, Wave transmission, Circuits.

The engineering research study made on constant input impedance microwave branching filters for possible use in transmission systems using surface wave lines or antennas is described. The design procedure used for the microwave branching filters are based on the theory and methods developed by Gouba. With equivalent circuits for cavity transducers, equivalent circuits for cavity transducers, equivalent circuits for coupling elements, and impedance transformation for cavity-waveguide-coupling arrangements given, the complete equivalent circuits for any general microwave filter can be developed. Single and double stage rejection and single and double stage pass filters were designed and fabricated. Agreement between the measured and calculated response was very good. A one stage constant impedance branching filter was designed and fabricated. Preliminary measurements on this filter are given but the study has not yet been completed. The study of filters and related problems will be continued. (Author)

Ordnance, Missiles, and Satellite Vehicles

NASA N62-16839 $0.75

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
EXPERIMENTAL INVESTIGATION OF THE IMPACE RESISTANCE OF DOUBLE-SHEET STRUCTURES AT VELOCITIES TO 24,000 FEET PER SECOND, by C. Robert Nysmith and James L. Summers. Oct 62, 24p. 5 refs. NASA TN D-1431.

PB 160 607 $1.60

Feltman [Research] Labs., Picatinny Arsenal, Dover, N. J.
BIBLIOGRAPHY OF METHODS OF MEASURING THE TEMPERATURE OF PYROTECHNIC FLAMES, by Jesse F. Tyroler. July 55, 17p. 26 refs. Technical rept. 2165; AD-68 346.

DESCRIPTORS: *Bibliography, *Pyrotechnics, Flames, Temperature, Measurement, *Thermocouples, *Pyrometers, *Spectrographic analysis.

This project was undertaken in order to find suitable methods for the determination of the temperature of high opacity flames. An annotated bibliography was compiled covering much of the available literature that may be applicable to pyrotechnic flame temperature determinations. As a result of this investigation, the following methods have been deemed most feasible for the study of pyrotechnic flames and flashes: (1) the photographic brightness pyrometer method, in which a direct study of the size of the flash and brightness temperatures can be made; (2) the line-reversal method (with modifications) which may be usable with small pyrotechnic flames (studies investigating the utilization of this method are now in progress); and (3) the method of obtaining flame temperatures by spectroscopic measurement of flame brightness per unit area at the wavelengths of strongly emitting lines or bands.

NASA N62-16470 $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
RELIABILITY AND REDUNDANCY CONSIDERATIONS IN SELECTING SPACECRAFT BATTERIES, by Joseph M. Sherfey and Klaus Johannsen. Oct 62, 6p. NASA TN D-1452.

NASA N62-16704 $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SATELLITE MOTION IN THE VICINITY OF CRITICAL INCLINATION, by David Fisher. Oct 62, 18p. 7 refs. NASA TN D-1470.

NASA N62-16705 $1.25

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SPACECRAFT INFORMATION SYSTEMS, by George H. Ludwig. Oct 62, 43p. 18 refs. NASA TN D-1348.

NASA N62-16103 $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
ENVIRONMENTAL PROBLEMS OF SPACE FLIGHT STRUCTURES. I. IONIZING RADIATION IN SPACE AND ITS INFLUENCE ON SPACECRAFT DESIGN, by Louis F. Vosteen. Oct 62, 34p. 38 refs. NASA TN D-1474.

NASA N62-16522 $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A PRELIMINARY EXPERIMENTAL INVESTIGATION OF AN ENERGY-ABSORPTION PROCESS EMPLOYING FRANGIBLE METAL TUBING, by John R. McGehee. Oct 62, 34p. 9 refs. NASA TN D-1477.

NASA N62-15431 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
SIMULATOR STUDIES OF SIMPLE ATTITUDE CONTROL FOR SPIN-STABILIZED VEHICLES, by H. D. Garner and H. J. E. Reid, Jr. Sep 62, 22p. 2 refs. Technical note D-1395.

NASA N62-16504 $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A STUDY OF THRUST VECTOR STEERING FOR RENDEZVOUS WITH A NEAR-EARTH SATELLITE UTILIZING A THREE-STAGE VEHICLE LAUNCHED OUT OF THE SATELLITE PLANE, by Charles P. Llewellyn. Oct 62, 36p. 2 refs. NASA TN D-1398.

NASA N62-16102 $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
WIND-TUNNEL MEASUREMENTS OF AERODYNAMIC DAMPING DERIVATIVES OF A LAUNCH VEHICLE VIBRATING IN FREE-FREE BENDING MODES AT MACH NUMBERS FROM 0.70 TO 2.87 AND COMPARISONS WITH THEORY, by Perry W. Hanson and Robert V. Doggett, Jr. Oct 62, 42p. 10 refs. NASA TN D-1391.

PB 162 332 $11.50

Office of the Chief of Ordnance, Dept. of the Army, Washington, D. C.
ORDNANCE ENGINEERING DESIGN HANDBOOK: AMMUNITION SERIES, FUZES, GENERAL AND MECHANICAL. Jan 60, 159p. 101 refs. Ordnance Corps Pamphlet ORDP-20-210.

DESCRIPTORS: *Handbooks, *Ordnance, Engineering, Design, *Ammunition, *Fuzes, *Percussion fuzes, Explosives, Arming devices.

This handbook presents information on the fundamental operating principles of fuzes and the design of fuzes and their components, with particular emphasis on the mechanical type of fuze as distinguished from the electrical type.

PB 162 331 $10.50

Office of the Chief of Ordnance, Dept. of the Army, Washington, D. C.
ORDNANCE ENGINEERING DESIGN HANDBOOK: EXPLOSIVES SERIES. SOLID PROPELLANTS, PART ONE. Aug 61, 136p. 135 refs. Ordnance Corps Pamphlet ORDP 20-175; NASA N62-13913.

DESCRIPTORS: *Handbooks, *Ordnance, Engineering, Design, *Explosives, *Propellants, Propelling charges, Guns, Rockets, Solid rocket propellants, Ballistics, Data, Thermochemistry, Combustion, Physical properties, Powders, Smokeless propellants, Crystals, Plastics, Polymers, Fuels, Binders.

This handbook has been prepared as one of a series on Explosives. It presents information on the design, functioning and manufacture of solid propellants for use in propelling charges for guns and rockets.

UCRL-13046 $2.60

Stanford Research Inst., Menlo Park, Calif.
DETONATION THROUGH STEEL, by David E. Brink. Technical rept. no. 1, on Subcontract 122. 30 Sep 58, 24p. SRI Proj. no. GD-2656.

FOOD, HANDLING, AND PACKAGING EQUIPMENT

Food

PB 162 325 $1.10

American Motors Corp., Detroit, Mich.
PASTEURIZATION BY RADIATION OF FRUITS AND VEGETABLES, by Arleen H. Arnold. Rept. no. 1 (Final), 25 Jan 57-24 Jan 60, on Pasteurization by Radiation of Cooked and Prepared Foods. [1960] 3p. File no. S-735.

DESCRIPTORS: *Radiation effects, *Fruits, *Pork, Food, *Vegetables, *Preservation, Odors, Taste, Acceptability.

Pork samples were used in a variety of Chinese dishes. The color fading from pink to a chalky grey color did not detract from its palatability, however, the aroma which developed during cooking was most objectionable.

AD-262 969 $1.10

Carnation Co., Van Nuys, Calif.
EFFECTS OF IRRADIATION ON CANNED FOOD PRODUCTS, by P. K. Bates. Rept. no. 2 (Final), 8 Mar 57-7 Mar 61, on Irradiation of Canned Food Products and Mixtures of Meat with Cereal and/or Vegetables, Cooked Meats and Dairy Products and Irradiation Studies on Chicken and Beef Vegetable Pies. [1961] 10p. File no. S-736.

DESCRIPTORS: *Radiation effects, *Food, *Preservation, Storage, Meat, Chicken, Vegetables, *Taste, Acceptability.

The effects of irradiation upon the organoleptical and bacteriological quality of frozen beef and chicken vegetable pies have been studied both immediately after irradiation and after storage of the irradiated pies in the unfrozen state ($38^{o}F.$). Pies were irradiated at levels of 1×10^5, 3×10^5 rads. None of the irradiated samples was judged as good in flavor or appearance as the control. Initially the samples receiving the highest dosage were unacceptable in flavor, and after storage at $38^{o}F.$ for two weeks, all samples were unacceptable in flavor. Bacteriological examinations indicated the coliform organisms were extremely sensitive to irradiation, whereas phychrophilic and mesophilic organisms were somewhat resistant even at the highest level of irradiation. An oxygen scavenger developed at the Carnation Research Laboratories was evaluated for use in reducing the oxygen level of canned meat products which were to be irradiated. The scavenger was found ineffective at temperatures of $0^{o}F.$ and $-25^{o}F.$ (Author)

PB 162 285 $9.60

Chicago U., Ill.
STUDY OF THE BASES FOR CHANGING FOOD ATTITUDES, by Peter H. Rossi and David Gottlieb. Progress rept. no. 1, 15 May-14 July 58, on Contract DA 19-129-qm-1117. [1958] 116p. 1,071 refs. File no. P-1114.

DESCRIPTORS: *Food, *Attitudes, Behavior, Consumption, *Nutrition, Military personnel, *Bibliography.

This report presents a bibliography of food research and a critical review and discussion of research dealing with food habits and attitudes. (Author)

PB 162 323 $1.10

National Dairy Products Corp., Glenview, Ill.
EFFECTS OF IRRADIATION ON FRESH FRUITS AND VEGETABLES, by W. L. Hock. Rept. no. 8 (Final), 6 Aug 56-5 Aug 58. [1958] 9p. File no. S-723; AD-AD-220 366.

DESCRIPTORS: *Fruits, *Vegetables, *Radiation effects, Preservation, Acceptability, Food, Storage, *Taste.

Pineapple chunks and fruit salad consisting mainly of citrus fruit have been irradiated by means of gamma rays in an attempt to increase the shelf-life of the fresh refrigerated fruit. Appreciable extension of shelf life occurred when irradiation level was of the order of 500,000 rads or more. Irradiation off-flavors were noticeable in samples receiving dosages as low as 100,000 rads. Attempts to eliminate or reduce irradiation off-flavors by including additives were not successful. Nor did irradiation while frozen eliminate off-flavor formation. (Author)

PB 162 324 $1.60

Reynolds Metals Co., Richmond, Va.
DESIGN OF CONTAINERS FOR IRRADIATED FOODS, by H. E. Collins. Rept. no. 3 (Final), 22 Jan 57-21 July 59. [1959] 11p. File no. S-734; AD-235 239.

DESCRIPTORS: *Containers, Design, Food, *Packaging, *Radiation effects, Laminates, Aluminum, Foils, Plastics, Films, Dose rate, Gamma rays.

Seven combinations of plastic films, aluminum foil, paper, and/or heat seal coatings were used to package 4 simulated foods. These various combinations were irradiated at pasteurization levels ($.1x10^6$ - $2x10^6$) with gamma radiation, stored at room temperature and examined quarterly for overall changes in physical characteristics. None of the pouches (4" x 6") made from these various combinations have shown any significant decrease in physical properties during the 9 mo evaluation, although there has been some apparent physical degradation of one or more of the components in some instances. On the other hand, there have been some instances where irradiation apparently has slightly improved one or more of the physical characteristics of the materials. (Author)

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

TID-16353 $3.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
THE APPLICATION OF GAS-LUBRICATED BEARINGS TO HIGH-SPEED TURBO-MACHINERY, by D. D. Fuller, M. W. Eusepi, and E. J. Gunter. Quarterly technical rept., 1 Mar-31 May 62, on Contract AT(30-1)-2512. 39p. Q-A2392-3-5.

Engines and Propulsion Systems

NASA N62-16104 $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN INVESTIGATION TO DETERMINE THE DISCHARGE AND THRUST CHARACTERISTICS OF AUXILIARY-AIR OUTLETS FOR A STREAM MACH NUMBER OF 3.25, by Allen R. Vick. Oct 62, 49p. 11 refs. NASA TN D-1478.

UCRL-6072 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
A STUDY OF HEAT AND MASS TRANSFER TO UNINSULATED LIQUID OXYGEN CONTAINERS, by David C. Holten. Rept. on Contract W-7405-eng-48. 20 July 60, 18p. 4 refs.

NASA N62-14819 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
AIR-PERFORMANCE EVALUATION OF A 4.0-INCH-MEAN-DIAMETER SINGLE-STAGE TURBINE AT VARIOUS INLET PRESSURES FROM 0.14 TO 1.88 ATMOSPHERES AND CORRESPONDING REYNOLDS NUMBERS FROM 2500 TO 50,000, by Robert Y. Wong and William J. Nusbaum. Aug 62, 40p. 2 refs. Technical note D-1315.

NASA N62-16523 $0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
COLD-AIR INVESTIGATION OF PROTOTYPE SNAP-8 TURBINE, by William J. Nusbaum and Donald E. Holeski. Oct 62, 16p. 2 refs. NASA TN D-1529.

NASA N62-16511 $1.25

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
COMBUSTION INSTABILITY LIMITS DETERMINED BY A NONLINEAR THEORY AND A ONE-DIMENSIONAL MODEL, by Richard J. Priem and Donald C. Guentert. Oct 62, 43p. 20 refs. NASA TN D-1409.

TID-11792 $1.60

Los Alamos Scientific Lab., N. Mex.
KIWI-A: THE FIRST ROCKET REACTOR EXPERIMENT, by R. E. Schreiber. 2 Mar 61. 19p. (LAS 29th Annual Meeting, New York City, January 23-25, 1961.) LADC-4674.

ORNL-2274(Pts. 1-5) $19.75

Oak Ridge National Lab., Tenn.
AIRCRAFT NUCLEAR PROPULSION PROJECT. Quarterly progress rept. for period ending 31 Mar 57. Rept. on Contract W-7405-eng-26. 11 July 57, declassified 10 Mar 62, 332p. 57 refs.

ORNL-2340(Pts. 1-5) $21.00

Oak Ridge National Lab., Tenn.
AIRCRAFT NUCLEAR PROPULSION PROJECT. Quarterly progress rept. for period ending 30 June 57 on Contract W-7405-eng-26. 12 Sep 57, declassified. 361p. 51 refs.

MATERIALS

PB 162 322 $2.60

Battelle Memorial Inst., Columbus, Ohio.
NONDESTRUCTIVE TESTING OF PLASTIC-GLASS LAMINATES, by R. L. Gibbs, K. D. Cooley and others. Quarterly rept. no. 1 on Contract NObs-55548. 21 July 52, 22p. 18 refs.

Photographs will not reproduce

DESCRIPTORS: *Plastics, *Glass, *Laminates, *Non-destructive testing, Liquids, Penetration, X-rays, Light, Ultrasonic radiation, Dielectric properties.

A literature survey was completed to determine what has been done in the field of nondestructive testing as applied to polyester-glass laminates. The samples used in the tests were 6 inches square and 1/4 inch thick with the exception of one which was 1/2 inch thick. A comparison of infrared, ultraviolet, and white light was made in the hope that the higher or lower frequency radiations might offer better penetration for opaque materials. The results thus far indicate that neither infrared nor ultraviolet reveal defects as well as white light in unpigmented samples. Another test using a liquid fluorescent dye penetrant was tried. Dielectric tests were made employing the principle that a change in the dielectric of a condenser will change its capacitance. Several different ultrasonic tests were tried and one type, the Sonizon, gave good indications of the dry spot and location of the cellophane.

PB 162 330 $2.60

Material Lab., New York Naval Shipyard, Brooklyn.
REPORT OF RESEARCH ON STABILITY OF RIGID POLYURETHANE FOAM PLASTICS, by I. Resnick. Progress rept. no. 10. 25 Apr 61, 26p. 10 refs. Lab. Project 6247.

DESCRIPTORS: *Plastics, *Expanded plastics, Polymers, *Urethanes, Physical properties, Tensile properties, Stability, Aging, Storage, Humidity.

The physical properties and stability of nine rigid polyurethane foams, having a nominal density of 6 lbs/ft^3, were investigated to determine their suitability for use as large scale void filling. Three of the materials were found to have relatively good stability. None of the samples conformed completely with a proposed list of requirements for void filling foam. However, several of the foams had good stability and physical properties which were close enough to the proposed requirements to merit serious consideration. Stability studies based on humid (accelerated) aging exposures and stowage (outdoors in metal lockers and floating in water for periods up to 1 3/4 years) were conducted on 3 rigid polyurethane foam samples having a nominal density of 2 lbs/ft^3.

PB 162 329 $2.60

[Portsmouth Naval Shipyard, N. H.]
THE EFFECT OF THERMAL SHOCK ON THE SHAPE AND ADHESION OF VARIOUS COMMERCIAL COMPOUNDS, by Matthew H. Riley. [1956] 28p.

DESCRIPTORS: *Molding materials, *Epoxy resins, *Rubber, Thermal stresses, Deformation, Adhesion.

PB 162 314 $5.60

Young Development Labs., Inc., Rocky Hill, N. J.
FILAMENT WOUND FIBER GLASS AND KEL-F FUEL TANK FOR WHITE FUMING NITRIC ACID, by J. Lowrie McLarty. Final summary rept. Nov 55-Mar 58, on Contract AF 33(600)27175. 3 Oct 58, 56p. Engineering rept. no. R1710-101; AD-208 216.

DESCRIPTORS: *Nitric acid, *Fuel tanks, *Jettisonable equipment, Design, Construction, Tests, *Glass textiles, *Filament-wound construction.

This report describes the design, fabrication and testing of one jettisonable 60 gallon tank constructed of a shell of filament-wound Kel-F coated fiber glass consolidated with a Kel-F coated fiber glass cloth lining for white fuming nitric acid (WFNA).

Ceramics and Refractories

TID-16478 $1.60

Denver Research Inst., Colo.
INTERMEDIATE-TEMPERATURE OXIDATION OF BERYLLIDES. Rept. on Contract AT(11-1)-1092. 8 July 62, 14p.

TID-16479 $1.10

Denver Research Inst., Colo.
INTERMEDIATE-TEMPERATURE OXIDATION OF BERYLLIDES. Rept. on Contract AT(11-1)-1092, Task C. 9 Aug 62, 9p.

ORO-575 $6.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
MECHANISM AND ACTIVATION ENERGY FOR DIFFUSION THROUGH SINGLE CRYSTAL AND POLYCRYSTALLINE HIGH TEMPERATURE MATERIALS, by Willis E. Moody. Final rept. on Contract AT(40-1)-2420. Dec 61, 66p. 20 refs.

AD-277 500 repriced $2.25

Little, Arthur D., Inc., San Francisco, Calif.
THERMODYNAMIC AND KINETIC STUDIES FOR A REFRACTORY MATERIALS PROGRAM, by L. A. McClaine. Rept. for July 60-Dec 61, on Ceramic and Cermet Materials Development, Contract AF 33(616)7472. Apr 62, 93p. 36 refs. ASD-TDR-62-204, Part I.

DESCRIPTORS: Refractory materials, *Thermodynamics, *Hafnium compounds, *Zirconium compounds, *Borides, *Carbides, Reaction kinetics, Preparation, Zone melting, High temperature research, Controlled atmospheres, Calorimeters, Enthalpy, Specific heat, Mass spectrometers, Spectrographic analysis, Electron diffraction analysis, Transport properties, Halides, Vaporization, Diffusion, Gas flow.

This report summarizes an integrated program of studies developed to provide thermodynamic and kinetic knowledge needed to describe the chemical behavior of zirconium and hafnium carbides and borides at temperatures to 3000K and in atmospheres of O_2, O_2+H_2O, Cl_2, HF, F_2, H_2, CO, NH_3, and N_2. The program consists of both internal and subcontracted efforts which can (1) provide, through calorimetric measurements, additional thermodynamic data needed for the tabulation of free energy functions of the zirconium and hafnium carbides and borides; (2) identify, by mass spectrometric means, gaseous species formed on vaporization of these carbides and borides and on their interaction with the several atmospheres; (3) provide thermodynamic data for important gaseous species through electron diffraction techniques, "matrix isolation" spectroscopy, and equilibria studies; and (4) develop the kinetics of the reactions of the carbides and borides with the various atmospheres through studies of the over-all rates of reactions and mass transport mechanisms. The status of each investigation is discussed in detail. (Author)

AD-284 469 repriced $1.25

National Carbon Co., Parma, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME VI: CREEP OF CARBONS AND GRAPHITES IN FLEXURE AT HIGH TEMPERATURES, by E. J. Seldin. Final rept. on Refractory Inorganic Non-metallic Materials, Materials Application, and Process Development for Graphite Materials, Contract AF 33(616)6915. June 62, 41p. 2 refs. WADD TR 61-72, Volume VI.

DESCRIPTORS: *Graphite, *Carbon, *Creep, Temperature, High temperature research, *Refractory materials, Inorganic substances, Materials, Mechanical properties.

Flexural creep tests have been made on molded carbons and several types of graphites over the temperature range from 2200° to 3000° C. The amount of creep was found to decrease for a carbon as the temperature of graphitization increased and as the holding time at graphitization temperature increased for times up to four hours. Activation energies were determined for several standard and experimental grades of graphite from the steady state creep rates. The activation energies ranged from 23 to 92 kcal/mole and appeared to be constant for each graphite. The flexure experiments demonstrated a marked dependence of the creep on the gain orientation for the more anisotropic graphites. The grain orientation showing the highest room temperature strength shows the lowest high temperature creep. Some of the factors which influenced the creep behavior are density, crystallite size, and the size, type and orientation of the particles. (Author) (See also AD-270 536)

ORNL-TM-334 $1.60

Oak Ridge National Lab., Tenn.
CALCULATION OF THE REQUIREMENTS FOR OPERATION OF REFRACTORY-METAL COMPONENTS AT HIGH-TEMPERATURE IN VACUUM, by R. E. Clausing. Rept. on Contract W-7405-eng-26. 18 Sep 62, 15p. 6 refs.

PB 162 273 $1.10

Research Chemicals Div., Nuclear Corp. of America, Burbank, Calif.
REFRACTORY GADOLINIUM AND HAFNIUM COMPOUNDS. Monthly rept. for 18 May-31 May 59, on Contract NObs-77145. [1959] 4p. Rept. no. RC 112; ARPA Order no. 81-59; AD-228 636.

DESCRIPTORS: *Gadolinium alloys, Hafnium, Alloys, *Intermetallic compounds, Electrical properties, Refractory materials, Physical properties.

A study of refractory gadolinium and hafnium compounds was initiated. The compositions under analysis include intermetallic compounds of gadolinium with bismuth, antimony, silicon, boron, phosphorus, and selenium, and intermetallic compounds of hafnium with silicon and boron. The determination of the Seebeck coefficient and the electrical resistivity of each intermetallic composition as a function of the temperature will be conducted.

ORO-558 $1.60

Institute of Molecular Biophysics, Florida State U., Tallahassee.
AN IBM 650 SIMULATOR PROGRAM FOR THE IBM 709, by George Friedman and Merle T. Emerson. Rept. on Contract AT(40-1)-1797. 1 Apr 62, 16p.

TID-6112 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
NEARLY LEAST SQUARES ESTIMATES IN HETEROSCEDASTIC REGRESSION, by Max Halperin. [1962] 11p. 4 refs.

KAPL-M-EPS-1 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
THE USE OF IMPROVED VALUES IN AN ALTERNATING-DIRECTION-IMPLICIT ITERATION TECHNIQUE, by E. P. Shelly. Rept. on Contract W-31-109-eng-52. 6 July 62, 18p. 3 refs.

UCRL-6226 $2.60

Lawrence Radiation Lab., U. of California, Livermore.
CLOSED EXTENSIONS OF THE LAPLACE OPERATOR DETERMINED BY A GENERAL CLASS OF BOUNDARY CONDITIONS, by W. G. Bade and R. S. Freeman. Rept. on Contract W-7405-eng-48. Dec 60, 27p. 22 refs.

UCRL-6272 $2.60

Lawrence Radiation Lab., U. of California, Livermore.
CLOSED EXTENSIONS OF THE LAPLACE OPERATOR DETERMINED BY A GENERAL CLASS OF BOUNDARY CONDITIONS, FOR UNBOUNDED REGIONS, by Robert S. Freeman. Rept. on Contract W-7405-eng-48. 6 Jan 61, 25p. 11 refs.

UCRL-6015 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
ON THE STABILITY OF CERTAIN DIFFERENCE SCHEMES FOR LINEAR PARABOLIC PDE WITH CONSTANT COEFFICIENT, by Thomas I. Seidman. Rept. on Contract W-7405-eng-48. 1 June 60, 16p. 2 refs.

UCRL-9227 $3.60

Lawrence Radiation Lab., U. of California, Berkeley.
THE REDUCTION OF BOOLEAN TRUTH FUNCTIONS TO MINIMAL FORM, by Alan Natapoff. Rept. on Contract W-7405-eng-48. 20 May 60, 39p. 7 refs.

TID-11268 $1.60

Sandia Corp., Albuquerque, N. Mex.
DETERMINATION OF CORRELATED QUANTITIES FROM EMPIRICAL DATA BY A MONTE CARLO PROCESS, by C. E. Abraham and W. H. Bradford. 11p. 10 refs. SCDC-922.

Computing Devices

KAPL-M-JA-6(Rev. IV) $10.50

Knolls Atomic Power Lab., Schenectady, N. Y.
KARE INPUT, by J. A. Archibald, Jr., and J. L. Fletcher. Rept. on Contract W-31-109-eng-52. 15 Aug 62, 129p. 7 refs.

TID-16403 $2.60

Sandia Corp., Albuquerque, N. Mex.
AUTOMATED TEST SYSTEMS, by T. F. Marker. Rept. on Contract AT(11-1)-789. 15 Sep 61, 29p. SCDC-2440.

KAPL-M-EC-20 $5.60

Knolls Atomic Power Lab., Schenectady, N. Y.
BMS: STRESS ANALYSIS OF CYLINDRICAL SHELLS, by D. G. Dight and R. F. Wojcieszak. Rept. on Contract W-31-109-eng-52. 1 June 62, 54p. 1 ref.

LADC-5288 $3.60

Los Alamos Scientific Lab., N. Mex.
THE PARTICLE-IN-CELL METHOD FOR NUMERICAL SOLUTION OF PROBLEMS IN FLUID DYNAMICS, by Francis H. Harlow. 21 Aug 62, 38p. 10 refs.

WAPD-DLE-320 $2.60

Westinghouse Research Labs,, Pittsburgh, Pa.
DEFLECTION OF TUBE SHEETS, by M. M. Leven. Preliminary rept. Rept. on Contract NObs-67500. 13 May 59, 28p. 10 refs. Research rept. 100FF996-R6-X.

WAPD-DLE-319 $2.60

Westinghouse Research Labs., Pittsburgh, Pa.
PHOTOELASTIC FROZEN STRESS STUDY OF THE EFFECTIVE ELASTIC CONSTANTS OF PERFORATED MATERIALS, by R. C. Sampson. Rept. on Contract NObs-67500. [1961] 26p. 6 refs. Research rept. 100FF996-R7-X.

Aerodynamics and Pneumatics

PB 162 333-1 $11.50

Allied Research Associates, Inc., Boston, Mass.
THERMOELASTIC RESPONSE OF AIRCRAFT STRUCTURES TO HIGH-INTENSITY THERMAL RADIATION, INCLUDING PREHEAT. PART I: EXPERIMENTAL PROGRAM AND TEST DATA, by Irving Frank, Richard E. Portnoy and others. Rept. on Contract AF 33(616)5001. Feb 60, 158p. 8 refs. WADC Technical rept. 59-597, Part I; AD-235 919.

DESCRIPTORS: *Airframes, *Thermal radiation, Measurement, Supersonic planes, *Aerodynamic heating, Stresses, Atomic bomb explosions, Elasticity, *Thermal stresses, Heat transfer.

A laboratory investigation of the response of full-scale aircraft components subjected to simulated supersonic nuclear weapon delivery conditions has been performed. The results of these tests are presented herein. Four production F-84F maneuvering stabilators were cut in half providing eight total specimens. Each half stabilator was instrumented with strain gages, thermocouples and deflection indicators. Strains and temperatures were recorded as functions of time, and deflections were photographed on 16 mm motion picture film. All but one specimen were subjected to an elevated equilibrium thermal condition prior to irradiation by a simulated thermal pulse of a nuclear detonation. One specimen was exposed to the latter heat input only. The techniques and instrumentation used in the experimental program are discussed herein. A qualitative discussion concerning the experimental temperature, strain, and deflection response has been made. In addition, a summary of observations arising from the experimental program and their consequences on nuclear weapon delivery capability is also given. (Author)

PB 162 333-2 $7.60

Allied Research Associates, Inc., Boston, Mass.
THERMOELASTIC RESPONSE OF AIRCRAFT STRUCTURES TO HIGH-INTENSITY THERMAL RADIATION, INCLUDING PREHEAT. PART II: CORRELATION OF EXPERIMENTAL TEMPERATURE DISTRIBUTION WITH ANALYSIS, by Irving Frank, Richard E. Portnoy, and Claude W. Brenner. Rept. on Contract AF 33(616)5001. Feb 60, 71p. 13 refs. WADC Technical rept. 59-597, Part II; AD-237 923.

DESCRIPTORS: *Aerodynamic heating, *Heat transfer, *Airplane panels, Riveted joints, Stabilizers (Horizontal tail surfaces), Analysis, Thickness, Surfaces, *Thermal stresses, Structures, *Thermal radiation

A two-dimensional heat transfer analysis was performed for one surface of a typical aircraft box-section. This analysis was developed for a riveted structure where the riveted joint between the skin and substructure provides some resistance to heat flow. The analysis utilizes a Laplace transform method of solution which yields approximate close form solutions to the heat conduction problem within the structure. A heat transfer analysis was also developed for the case where the box-structure has a skin of tapered thickness. The La-

place transform method of solution is also used in the derivation of this solution. Theoretical temperatures were calculated by means of these analyses for an F-84 F stabilator section. These values were compared to experimental temperature data obtained during tests on an F-84 F stabilator at the WADC thermal facility. Good agreement between theory and experiment was found in all but a few isolated instances. (Author) (See also PB 162 333-1)

NASA N62-15427 $2.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
CHARTS FOR EQUILIBRIUM FLOW PROPERTIES OF AIR IN HYPERVELOCITY NOZZLES, by Leland H. Jorgensen and Gayle M. Baum. Sep 62, 105p. 14 refs. Technical note D-1333.

NASA N62-16812 $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
PREDICTED GAS PROPERTIES IN THE SHOCK LAYER AHEAD OF CAPSULE-TYPE VEHICLES AT ANGLES OF ATTACK, by George E. Kaattari. Oct 62, 32p. 8 refs. NASA TN D-1423.

TID-12426 $1.60

Argonne National Lab., Ill.
BOUNDARY LAYER IN THERMAL RADIATION ABSORBING AND EMITTING MEDIA, by R. Viskanta and R. J. Grosh. Feb 61, 17p. 12 refs.

PB 162 333-3 $5.60

Atlantic Research Associates, Inc., Boston, Mass.
THERMOELASTIC RESPONSE TO AIRCRAFT STRUCTURES TO HIGH-INTENSITY THERMAL RADIATION, INCLUDING PREHEAT. PART III: CORRELATION AND EXPERIMENTAL STRAIN DISTRIBUTION WITH ANALYSIS, by Irving Frank and Richard E. Portnoy. Rept. on Contract AF 33(616)5001. Feb 60, 59p. 21 refs. WADC Technical rept. 59-597, Part III; AD-237 924.

DESCRIPTORS: *Thermal stresses, *Aerodynamic heating, Atomic bomb explosions, *Thermal radiation, *Elasticity, Stabilizers (Horizontal tail surfaces, Tests, Jet fighters, Distribution, Analysis, Heat transfer

A laboratory investigation of the response of full-scale aircraft components, subjected to simulated supersonic nuclear weapon conditions was performed. A thermal strain correlation is presented, comparing the experimentally determined thermal strains for the substructures fo F-84F stabilators with theoretical strain values. The experimental strain values apply to F-84F stabilators with and without preheat subjected to transient heat inputs on one surface. The theoretical strain results are determined by means of an elementary one-dimensional thermal stress analysis. Some major factors affecting the accuracy of the correlation are discussed, and graphs comparing the experimental and theoretical strains values are presented. A one-dimensional thermal stress analysis, which includes the effect of skin buckling for a box-section subjected to a non-uniform heat input, is presented. Critical strain for the onset of buckling in the skin is found as a function of box-section geometry, temperature gradients and edge conditions. The results of the analysis are presented in graphical and analytical form. A representative calculation for the tip deflection of the entire stabilator under thermal loading is presented and a comparison made with observed values. (Author) (See also PB 162 333-2)

NASA N62-16008 $2.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A TABULATION OF WIND-TUNNEL PRESSURE DATA AND SECTION AERODYNAMIC CHARACTERISTICS AT MACH NUMBERS OF 1.61 AND 2.01 FOR TWO TRAPEZOIDAL AND THREE DELTA WINGS HAVING DIFFERENT SURFACE SHAPES, by Emma Jean Landrum. Sep 62, 72p. 1 ref. NASA TN D-1394.

UCRL-6256 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
AERODYNAMIC TURBULENT SKIN FRICTION, by Stirling A. Colgate. Rept. on Contract W-7405-eng-48. 8 Feb 61, 19p. 6 refs.

TID-16331 $11.00

New Mexico U. Engineering Experiment Station, Albuquerque
EXPERIMENTAL INVESTIGATIONS OF THE INTERACTION OF AN OBLIQUE SHOCK WAVE AND A TURBULENT BOUNDARY LAYER, by Victor J. Skoglund and Amado A. Trujillo. Rept. on Contract AT(29-1)-789. June 62, 141p. 28 refs. SCDC-2738.

PB 162 326 $6.60

Polytechnic Inst. of Brooklyn, N. Y.
PRESSURE AND LAMINAR HEAT TRANSFER RESULTS IN THREE-DIMENSIONAL HYPERSONIC FLOW, by Victor Zakkay. Technical rept. on Aerodynamic Research, Contract AF 33(616)-3265. Sep 58, 69p. 27 refs. WADC Technical note 58-182; AD-155 679.

DESCRIPTORS: *Hypersonic flow, Blunt bodies, Conical bodies, *Pressure, *Heat transfer, *Aerodynamics, Aerodynamic configurations, Model tests, Laminar boundary layer, *Aerodynamic heating.

An experimental investigation of the pressure and heat transfer distribution in hypersonic flow has been carried out. First there is presented a brief review of the methods of analysis available for the pressure and heat transfer distribution on axially symmetric cones at angles of attack. An approximate method for determining the peripheral pressure distribution about axially symmetric blunted cones at an angle of attack is developed. Tests were performed at a Mach number of

6.0 in the hypersonic facility of the PIBAL to determine the heat transfer and pressure distribution over a blunted axially symmetric body at various angles of attack. The measurements are compared with existing theories, and particularly with the recently developed theory of Vaglio-Laurin. In an appendix, a method for determining the crossflow velocity gradient ($\partial w/\partial \varphi$) from the peripheral pressure distribution is included. (Author)

METALLURGY

IS-503 $6.60

Ames Lab., Iowa State U. of Science and Tech.
EFFECT OF OXYGEN ON MECHANICAL PROPERTIES OF NIOBIUM, Edwin Paul Neubauer and H. A. Wilhelm. Rept. on Contract W-7405-eng-82. May 62, 63p. 31 refs.

TID-16527 &(suppl.) $8.60

Arizona U. Coll. of Mines, Tucson.
THE FREQUENCY OF ANNEALING TWINS, by D. J. Mack, D. J. Murphy, and J. R. Hancock. Rept. 15 June 61-15 June 62, on Contract AT(11-1)-1040. [1962] 86p. 36 refs.

BMI-1277 $2.60

Battelle Memorial Inst., Columbus, Ohio.
PROPERTIES OF ARC-MELTED CHROMIUM-BASE ALLOYS, by Daniel J. Maykuth, John W. Roberts, Jr. and Robert I. Jaffee. Rept. on Contract W-7405-eng-92. 14 July 58, declassified 19 June 62. 27p. 2 refs.

PB 162 321-1 $18.50

Boeing Co., Seattle, Wash.
MANUFACTURING METHODS FOR "HOT STRUCTURES", by J. Claus, D. Meredith, and F. Sutch. Final technical engineering rept. for 1 June 59-15 Sep 60, on Contract AF 33(600)39542. Dec 60, 300p. 15 refs. Rept. no. MDF-2-17064-I; AMC TR-60-7-795, Section I, Vol. I; AD-250 054.

DESCRIPTORS: Welding, Processing, Joints, Heat treatment, *Hypervelocity vehicles, Gliders, Design, Metals, *Airplane panels, *Airframes, *Manufacturing methods, Alloys, Materials, Cleaning.

Designs of structural segment, joints, and skin panels typical of those that might be used in a Hot Structures boost-glide type of vehicle were selected for fabrication and test. On the basis, of base-metal mechanical properties tests, Rene' 41, HS 25, and Hastelloy X were selected for use in these assemblies and the cleaning, heat treating, and welding process specifications needed in their fabrication were developed. (Author)

PB 162 321-2 $22.25

Boeing Co., Seattle, Wash.
MANUFACTURING METHODS FOR "HOT STRUCTURES", by J. Claus, D. Meredith, and F. Sutch. Final technical engineering rept. 1 June 59-15 Sep 60, on Contract AF 33(600)39542. Dec 60, 444p. 42 refs. Rept. no. MDR-2-17064-II; AMC TR-60-7-795, Section I, Vol. II; AD-250 750.

DESCRIPTORS: Manufacturing methods, Welding, Hydroforming, Machining, *Nickel alloys, Mechanical properties, Aerodynamic heating, Electroerosive machining, Cleaning, *Hypersonic test vehicles, *Cobalt alloys, Explosive forming, Heat treatment.

Development work in cleaning and descaling, forming, tube processing, heat treating, machining, and welding was done to provide manufacturing techniques needed to produce typical Hot Structures assemblies from Rene' 41, HS 25, and Hastelloy X. Using the methods developed, segments, joints, and skin panels were fabricated successfully from the three alloys. (Author) (See also PB 162 321-1)

PB 162 321-3 $16.50

Boeing Co., Seattle, Wash.
MANUFACTURING METHODS FOR "HOT STRUCTURES", by J. Claus, H. Dillman, and F. Sutch. Final technical engineering rept. 1 June 59-15 Sep 60, on Contract AF 33(600)39542. Dec 60, 256p. Rept. no. MDR-2-17064-III; AMC TR-60-7-795, Section I, Vol. III; AD-251 498.

DESCRIPTORS: *Hypersonic test vehicles, *Cobalt alloys, *Nickel alloys, Welding, *Manufacturing methods, Heat treatment, Model tests, Machining, Simulation, Aerodynamic heating, Re-entry vehicles, Temperature, Design, Welded joints, Pipes, Airplane panels.

Environmental life tests were conducted on typical Hot Structures segments, joints, and skin panels fabricated of Rene' 41, HS 25, and Hastelloy X. Rene' 41 and HS 25 then were utilized in a Hot Structures model component representative of the forward 10.5 ft of a hypersonic, boost-glide vehicle. This structure was fabricated successfully using manufacturing methods and techniques developed earlier in the program. Typical wing, body, and wing-to-body joints constructed from each of the three superalloys were tested by applying cyclic axial loads and bending loads through the members at 1800 and 2000 F. All the joint specimens successfully withstood the representative service life testing. (Author) (See also PB 162 321-2)

TID-14983 $4.60

Florida U. Engineering and Industrial Experiment Station, Gainesville.
AN EVALUATION OF THE ROLE OF DEFORMATION TWINNING IN THE PLASTIC DEFORMATION OF ZIRCONIUM. Quarterly progress rept. no. 2 on Contract AT(38-1)-252. Jan 62, 42p. 4 refs.

TID-16574 $3.60

Florida U. Engineering and Industrial Experiment Station, Gainesville.
AN EVALUATION OF THE ROLE OF DEFORMATION TWINNING IN THE PLASTIC DEFORMATION OF ZIRCONIUM. Quarterly progress rept. no. 4, Apr-June 62, on Contract AT(38-1)-252. July 62, 35p. 6 refs.

AD-284 293 repriced $4.00

General Dynamics/Astronautics, San Diego, Calif.
PHYSICAL AND MECHANICAL PROPERTIES OF PRESSURE VESSEL MATERIALS FOR APPLICATION IN A CRYOGENIC ENVIRONMENT, by J. L. Christian. Final rept. Dec 60-Jan 62, on Materials Application, Contract AF 33(616)7719. Mar 62, 273p. 38 refs. Rept. no. AE62-0102; ASD-TDR-62-258.

DESCRIPTORS: *Pressure vessels, Materials, *Stainless steel, *Aluminum alloys, *Titanium alloys, Alloys, Physical properties, Mechanical properties, Sheets, Welded joints, *Cryogenics, Stresses, Fatigue (Mechanics).

The primary objective of this program has been to develop simple laboratory-type tests to evaluate the toughness of high strength sheet alloys and their complex welded joints at cryogenic temperatures. Another objective of this program has been to obtain useful engineering data on the mechanical properties of a number of materials currently being used or proposed for use in cryogenic-fueled missiles and space vehicles. The tests employed for evaluating the toughness of sheet materials included notched tensile tests having stress concentration factors of 3.2, 6.3, and 19, cross-tension and tensile shear tests of individual resistance spot welds, and tensile tests of simple fusion welds. These tests were conducted at 78°, -100°, -320°, and -423° F. These data, as well as data obtained from tensile tests of the base metal, percent martensite determinations, and metallographic examinations of fractured coupons, were correlated with low-cycle, high-stress fatigue data obtained on complex welded joints at 78°, -320°, and -423° F. The most consistent index of toughness was found to be the notched (K_t = 6.3)/unnotched tensile ratio. The test data are presented in tabular and in graphical form to aid metallurgical and design engineers in the selection of materials for structural applications at cryogenic temperatures. The test data were reduced by statistical methods and analyzed. (Author)

TID-16372 $1.60

Illinois U., Urbana.
ON ENHANCED-DIFFUSION IN METALS DURING PLASTIC DEFORMATION, by R. W. Balluffi and A. L. Ruoff (Cornell U.) Rept. on Contract AT(30-1)-2504. 1962, 14p. 14 refs.

IS-265 $9.60

Institute for Atomic Research, Iowa State U. of Science and Tech., Ames.
ANALYTICAL CHEMISTRY OF COBALT, by John M. Dale and Charles V. Banks. [1961] 114p. 205 refs.

UCRL-9593 $3.60

Lawrence Radiation Lab., U. of California, Berkeley.
DISLOCATION SUBSTRUCTURES IN DEFORMED AND RECOVERED MOLYBDENUM, by R. Benson, G. Thomas, and J. Washburn. Rept. on Contract W-7405-eng-48. Mar 61, 32p. 5 refs.

TID-11173 $1.10

Los Alamos Scientific Lab., N. Mex.
DISPERSION STRENGTHENING OF MOLYBDENUM AT HIGH TEMPERATURES, by W. V. Green and T. J. Ready. [1961] 3p.

TID-11526 $1.10

Los Alamos Scientific Lab., N. Mex.
METALLOGRAPHIC CHARACTERISTICS OF OXIDES, NITRIDES, AND CARBIDES IN ALPHA TANTALUM, by Robert W. Anderson. [1961] 6p. 3 refs.

TID-16719 $1.10

Materials Research Lab., U. of California, Berkeley.
CREEP OF ALLOYS, by E. R. Parker and T. H. Hazlett. Final rept. on Contract AT(11-1)-34. Aug 62, 8p. 32 refs. Series no. 28, issue no. 26.

ORNL-TM-336 $1.60

Oak Ridge National Lab., Tenn.
EVALUATION OF SUBSIZE IZOD SPECIMEN DESIGNS FOR DETERMINING THE NOTCH TOUGHNESS OF ZIRCALOY-2, by J. J. Prislinger. Rept. on Contract W-7405-eng-26. 1 Oct 62, 16p. 2 refs.

ORNL-TM-294 $3.60

Oak Ridge National Lab., Tenn.
"LIFE" TESTS ON INTERNALLY WATER-COOLED HOLLOW COPPER CONDUCTORS, by J. Lewin. 18 July 62, 33p. 5 refs.

TID-16386 $1.10

Rensselaer Polytechnic Inst., Troy, N. Y.
PROJECT ON ANISOTROPIC DIFFUSION AND ELECTROMIGRATION, by H. B. Huntington. Annual rept. on Contract AT(30-1)-1044. Aug 62, 7p. 4 refs.

TID-16136 $3.60

Sandia Corp., Albuquerque, N. Mex.
CASTING [CASTINGS: PROCUREMENT AND DESIGN PRINCIPLES] by L. P. Wilson. Rept. on Contract AT(39-1)-789. June 62, 37p. SCDC-2703.

PB 162 264 $11.50

Thompson [Ramo Woolridge] Inc., Cleveland, Ohio.
THE STUDY OF THERMENOL AS AN AIRCRAFT PARTS MATERIAL; by W. L. Weddel, F. Lally, and F. N. Lake. Final rept. on Contract NOa(s) 56-226-c. 15 Aug 57, 155p. Rept. no. JER-171; AD-149 949.

DESCRIPTORS: *Aircraft equipment, Materials, *Compressor blades, *Aluminum alloys, *Iron alloys, *Titanium alloys, Powder metals, Sintering, Extrusion, Brazing, Molding, Tensile properties, Hardness.

Thermenol was studied as an aircraft high-temperature structural material. To improve the room-temperature ductility of Thermenol, the effects of modifications of the chemical composition, melting cycles, and heat treatment upon the room-temperature ductility were evaluated. The producibility of Ti alloy compressor blades by powder-metal techniques was studied. Methods investigated included cold and hot pressing, vacuum and protective atmosphere sintering, extruding, rolling, and forging of blades from preforms fabricated by the powder-metal process. The producibility was investigated of hollow, second-stage XJ-65 Ti alloy compressor blades fabricated by brazing together formed sections of sheet stock.

TID-16379 $1.60

W. M. Keck Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
RAPID QUENCHING OF LIQUID ALLOYS, by Pol Duwez and R. H. Willens. Technical rept. no. 7 on Contract AT(04-3)-221. July 62, 15p. 13 refs.

CVNA-44 $2.60

Westinghouse Electric Corp., Pittsburgh, Pa.
BONDING OF ZIRCALOY NICKEL-IRON ALLOYS AND STAINLESS STEEL, by R. K. McGeary. Feb 60, 24p. 3 refs.

Ferrous Metals

ORNL-TM-293 $4.60

Oak Ridge National Lab., Tenn.
HIGH-TEMPERATURE REACTIONS OF TYPE 304 STAINLESS STEEL IN LOW CONCENTRATIONS OF CARBON DIOXIDE AND CARBON MONOXIDE, by H. Inouye. Rept. on Contract W-7405-eng-26. 29 Aug 62, 49p. 7 refs.

TID-16191 $1.10

RIAS, Inc., Baltimore, Md.
DETERMINATION OF THE DILATION PARAMETERS IN MARTENSITIC TRANSFORMATIONS, by H. M. Otte. Jan 62, 10p. 14 refs.

Light Metals

UCRL-6391 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
VACUUM FURNACE BRAZING OF BERYLLIUM, by Eldon F. Westlund. Rept. on Contract W-7405-eng-48. Mar 61, 20p. 1 ref.

NMI-1903 $2.60

Nuclear Metals, Inc., Concord, Mass.
BERYLLIUM CORROSION, by J. P. Pemsler, D. S. Kneppel, and R. G. Jenkins. Quarterly rept. 25 Apr-25 July 62, on Contract AT(30-1)-3012. 31 Aug 62, 29p. 2 refs.

Structural Metallurgy and Corrosion

HW-73378 $1.60

Hanford Atomic Products Operations, Richland, Wash.
A COMPARISON OF THE CORROSION OF 304-L STAINLESS STEEL AND A-55 TITANTUM IN THE PUREX WASTE ACID SYSTEM, by W. L. Walker. Rept. on Contract AT(45-1)-1350. 28 Sep 61, 13p.

TID-6408 $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
UNUSUAL OXIDATION STATES ENCOUNTERED IN CORROSION PROCESSES, by E. C. Pitzer. Rept. on Contract W-31-109-eng-52. [1961] 8p. 9 refs.

NASA N62-15893 $2.75

Michigan U., Ann Arbor.
RELATIONS BETWEEN MICROSTRUCTURE AND CREEP-RUPTURE PROPERTIES OF NICKEL-BASE ALLOYS AS REVEALED BY OVERTEMPERATURE EXPOSURES, by John P. Rowe and J. W. Freeman. Sep 62, 151p. 18 refs. NASA Technical note D-1325.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

NYO-10142 $2.60

Air Reduction Co., Inc., Murray Hill, N. J.
RESEARCH ON APPLICATIONS OF KRYPTON 85, by W. G. Marancik and P. S. Minetti. Quarterly progress rept. no. 2, 1 Jan-31 Mar 62, on Contract AT(30-1)-2906. 25p. 19 refs.

BNL-5151 $1.60

Brookhaven National Lab., Upton, N. Y.
THE MILNE PROBLEM FOR A NON-ABSORBING MEDIUM WITH LINEARLY ANISOTROPIC SCATTERING, by Hiroshi Takahashi. Dec 60, 18p. 4 refs.

TID-16011 $2.60

Brown University, Providence, R. I.
EXPERIMENTAL AND THEORETICAL HIGH ENERGY PHYSICS, by David Feldman and Anatole M. Shapiro. Progress rept. on Contract AT(30-1)-2262. 1 June 62, 24p. 4 refs.

TID-16374 $5.60

California Research Corp., Richmond.
RADIATION STABILITY OF ORGANIC FLUIDS, by R. O. Bolt, M. L. Burrous and others. Progress rept., 1 Jan-31- Mar 62, on Contract AT(04-3)-248. 15 June 62, 55p. 20 refs.

EFINS-62-26 $4.60

Enrico Fermi Inst. for Nuclear Studies, U. of Chicago, Ill.
THE SINGLE PARTICLE NILSSON MODEL FOR ODD-A NUCLEI IN 1d-2s SHELL, by Kumar H. Bhatt. May 62, 43p. 11 refs.

TID-15715 $2.60

Florida State U., Tallahassee.
THE EFFECT OF DISPERSION INTERACTION ON NUCLEAR MAGNETIC RESONANCE SHIFTS, by Bentz B. Howard, Bruno Linder, and Merle T. Emerson. 15 Aug 61, 24p. 20 refs.

GA-3371 $2.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
NEUTRON INTERACTIONS IN LIQUID PARA-AND ORTHO-HYDROGEN, by W. L. Whittemore and H. R. Danner. Rept. on Contract AT(04-3)-167. 8 Aug 62, 25p. 5 refs.

GA-3176 $5.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
STATUS OF NEUTRON SPECTRA MEASUREMENTS, by J. R. Beyster, J. C. Young and others. Rept. on Contract AT(04-3)-167. Apr 62, 51p. 12 refs.

TID-16336 $2.60

Geophysics Corp. of America, Bedford, Mass.
STUDY OF TECHNIQUES FOR DETERMINING DISTRIBUTION OF RADIOACTIVE MATERIAL DEPOSITED IN THE UPPER ATMOSPHERE. Quarterly status rept. no. 1, 19 Mar-19 June 62, on Contract AT(30-1)-2908. [1962] 28p. 5 refs.

HW-SA-1972 $3.60

Hanford Atomic Products Operation, Richland, Wash.
ABSORPTIOMETRY WITH POLYCHROMATIC X-RAYS, by Maurice C. Lambert. Rept. on Contract AT(45-1)-1350. 1 Sep 60, 38p. 23 refs.

HW-60145 $1.10

Hanford Atomic Products Operation, Richland, Wash.
COMMENTS ON FAST EFFECT CALCULATIONS, by G. D. Joanou. Rept. on Contract AT(45-1)-1350. 24 Apr 54, 8p. 8 refs.

HEPL-266 $1.60

High-Energy Physics Lab., Stanford U., Calif.
ANNIHILATION IN FLIGHT OF 200 AND 800 MEV POSITRONS, by A. Browman and J. Pine. [1962] 12p. 10 refs.

HEPL-267 $8.60

High-Energy Physics Lab., Stanford U., Calif.
INELASTIC ELECTRON SCATTERING, by W. C. Barber. 6 July 62, 91p. 109 refs.

TID-16581 $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
TWO DIMENSIONAL THERMAL SPECTRUM CALCULATIONS, by J. W. Smiley, J. J. Bulmer, and J. P. Shannon. [1962] 6p. 7 refs.

TID-12780 $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
VARIATIONAL METHODS IN NEUTRON THERMALIZATION, by D. S. Selengut. 2 May 61, 9p. 14 refs.

UCRL-10028 $10.50

Lawrence Radiation Lab., U. of California, Berkeley.
THEORY OF NUCLEON-NUCLEON SCATTERING IN THE STRIP APPROXIMATION TO THE MANDELSTAM REPRESENTATION, by John M. Charap, Elihu Lubkin, and Antonio Scotti. Rept. on Contract W-7405-eng-48. 19 Dec 61, 138p. 17 refs.

LA-1721(2nd Ed.)(Rev.) $5.60

Los Alamos Scientific Lab., N. Mex.
COLLECTED RADIOCHEMICAL PROCEDURES (RADIOCHEMISTRY GROUP-J-11), comp. by Jacob Kleinberg. Rept. on Contract W-7405-eng-36. Jan 58, 57p. Supersedes LA-1566; LA-1567; LA-1721(1st ed.); and LA-1722.

TID-16119 $2.60

Lyman Lab. [of Physics] Harvard U., Cambridge, Mass.
RESEARCH IN HIGH ENERGY NUCLEAR PHYSICS. Rept. on Contract AT(30-1)-2752. 23 May 62, 27p.

LADC-5381 $5.60

New Mexico U., Albuquerque.
THE DETERMINATION OF THERMAL NEUTRON DENSITY FROM THE ABSOLUTE MEASUREMENT OF THE ACTIVITY INDUCED IN GOLD FOILS, by Munson M. Thorpe. Master's thesis. May 62, 59p. 18 refs.

ORNL-TM-346 $2.60

Oak Ridge National Lab., Tenn.
HAZARDS ANALYSIS OF FUEL HANDLING FACILITIES, by E. D. Arnold and J. P. Nichols. 24 Aug 62, 30p. 4 refs.

ORNL-TM-363 $4.60

Oak Ridge National Lab., Tenn.
IDENTIFICATION AND COMPARISON OF PHYSICAL EVIDENCE FOR LAW ENFORCEMENT PURPOSES BY NEUTRON ACTIVATION ANALYSIS, by L. C. Bate, M. J. Pro, and G. W. Leddicotte. 11 Sep 62, 40p. 8 refs.

ORNL-TM-297 $4.60

Oak Ridge National Lab., Tenn.
UNIT OPERATIONS SECTION, by M. E. Whatley, P. A. Haas and others. Monthly progress rept., May 62. 9 Oct 62, 46p.

CU(PNPL)-214 $3.60

Pegram Nuclear Physics Labs., Columbia U., New York.
PROGRESS REPORT, OCTOBER-DECEMBER, 1961. Rept. on Contract AT(30-1)-GEN-72. 36p.

NYO-10240 $2.60

Rochester U., N. Y.
THE INFLUENCE OF IONIZATION LOSS ON THE SHAPE OF THE DIFFERENTIAL PRIMARY COSMIC RAY ENERGY SPECTRUM, by M. V. K. Appa Rao and M. F. Kaplon. Rept. on Contract AT(30-1)-875. 30 July 62, 30p. 17 refs.

NYO-10243 $1.60

Rochester U., N. Y.
ISOTOPIC ANALYSIS OF PRIMARY COSMIC RADIATION, by M. V. K. Appa Rao. Rept. on Contract AT(30-1)-875. 15 Aug 62, 14p. 13 refs.

TID-16124 $8.10

Rutgers State U., New Brunswick, N. J.
STUDIES IN NUCLEAR AND RADIOCHEMISTRY, by Rolfe H. Herber. Progress rept, 1 May 61-30 Apr 62, on Contract AT(30-1)-2472. [1962] 84p. 14 refs.

PB 162 310 $13.50

Technical Research Group, Syosett, N. Y.
MONTE CARLO CALCULATIONS OF GAMMA RAY PENETRATION, by Herbert Steinberg and Ralph Aronson. Rept. on Contract AF 33(616)6081. Aug 60, 197p. 5 refs. WADC Technical rept. 59-771; AD-247 173.

DESCRIPTORS: *Gamma rays, Penetration, Nuclear flux density, Shielding, Transmission, Dose rate, Mathematical analysis, Games theory, Numerical methods and procedures, Mathematical computer data, *Coding.

Two high efficiency Monte Carlo codes, for computing gamma ray transmission through slab and spherical shields respectively, were developed. Fractional deviations in transmitted current of above 5% are obtained for shields up to 15 to 20 mean free paths thick in about 3 minutes running time on the IBM-704 by use of importance sampling. A similarity transformation enables one to compute transmission for shields of several thicknesses at once, with only a small increase in running time. Results were obtained for transmission of radiation incident on plane lead slabs 2-12 mean free paths thick and on iron and aluminum slabs 2-10 mean free paths thick at angles of 0 degrees, 15 degrees, 30 degrees, 45 degrees, 60 degrees, and 75 degrees with the normal. The transmitted energy spectrum of 8 and 10-Mev bremsstrahlung radiation incident on 4 and 6-inch lead slabs was also computed. A number of problems were done in spherical geometry and the results described. (Author)

UNC-5028 $1.60

United Nuclear Corp., White Plains, N. Y.
DEVELOPMENT OF A CONTINUOUS METER FOR OXYGEN IN SODIUM, by H. Steinmetz. Quarterly progress rept. 1 Mar-31 May 62, on Contract AT(30-1)-2877. 15 July 62, 17p. 4 refs.

GEAP-3944 $11.50

Vallecitos Atomic Lab. [Pleasanton] Calif.
CALCULATED SCATTERING KERNELS FOR LIGHT WATER AT 23° C, 42° C, 61° C, 82° C, by B. A. Kerr. Rept. on Contract AT(04-3)-189. May 62, 152p. 3 refs.

GEAP-3943 $3.60

Vallecitos Atomic Lab. [Pleasanton] Calif.
CALCULATIONAL MODELS OF NEUTRON DIFFUSION LENGTH EXPERIMENTS IN LIGHT WATER, by B. A. Kerr. Rept. on Contract AT(04-3)-189. May 62, 32p. 15 refs.

GEAP-3216 $3.60

Vallecitos Atomic Lab., Pleasanton, Calif.
POST-IRRADIATION EXAMINATION OF CORED, EDGE LOADED, THORIA-URANIA NUCLEAR FUEL, by T. J. Slosek. Rept. on Contract N8-S-452. July 59, 34p.

TID-16432 $7.60

Vanderbilt U., Nashville, Tenn.
EFFECTS OF IONIZING RADIATION ON VINYLIDENE CHLORIDE, CIS, TRANS-DIBROMOETHYLENE, TRIBROMOETHYLENE AND 2-FLUOROPROPENE, by Ellis Norman Harold. Master's thesis. June 62, 73p. 23 refs.

Elementary Particles

TID-16625 $1.10

Brown U., Providence, R. I.
OFF-THE-ENERGY-SHELL EFFECTS IN NUCLEON-DEUTERON SCATTERING, by K. L. Kowalski and D. Feldman. Rept. on Contract AT(30-1)-2262. [1962] 8p. 3 refs.

TID-16623 $1.10

Brown U., Providence, R. I.
STUDY OF PION-HYPERON RESONANCES BY DISPERSION RELATIONS IN THE UNPHYSICAL SHEET, by R. C. Hwa and D. Feldman. Rept. on Contract AT(30-1)-2262. 6p.

PB 162 328 $9.60

Defense Atomic Support Agency, Washington, D. C.
CALCULATED ABUNDANCES AND ACTIVITIES OF THE PRODUCTS OF HIGH ENERGY NEUTRON FISSION OF URANIUM-238, by P. J. Dolan. May 59, 116p. 8 refs. Technical analysis rept. DASA 525.

DESCRIPTORS: *Neutrons, *Uranium, *Fission products, Energy, Nuclear reactions, Radioactive decay, Nomographs.

Calculated abundances and activities of each fission product radionuclide as well as the activity of the total fission product mixture at various times after simultaneous high energy neutron fission of 10,000 atoms of Uranium-238 are presented in tabular form. The percentage contribution to the total activity of each fission product radionuclide and the disintegration rate of the total fission product mixture are presented graphically (Author)

EFINS-62-9 $11.00

Enrico Fermi Inst. for Nuclear Studies, U. of Chicago, Ill.
THE NUCLEAR INTERACTIONS OF THE HYPERONS, by R. H. Dalitz. A series of lectures delivered at the Summer School in Theoretical Physics, 1961, at Bangalore, India. 119p. 87 refs.

NYO-10244 $9.10

Rochester U., N. Y.
RELATIVISTIC INVARIANCE AND HAMILTONIAN THEORIES OF INTERACTING PARTICLES, by D. G. Currie, T. F. Jordan, and E. C. G. Sudarshan. Rept. on Contract AT(30-1)-875. 4 June 62, 102p. 36 refs.

Instruments and Installations

TID-16753 $1.60

Badger Meter Mfg. Co., Milwaukee, Wis.
DEVELOPMENT LEADING TO AN IMPROVED DENSITOMETER FOR HELIUM-GRAPHITE OR NITROGEN-GRAPHITE FLOW STREAMS. Quarterly rept. no. 189-9, May-July 62, on Contract AT(11-1)-1111. 31 Aug 62, 15p.

TID-16811 $2.60

Brown U., Providence, R. I.
A PENCIL BEAM FOR USE WITH LIQUID H_2 "FINGER" TARGETS, by R. E. Lanou, Jr. Internal rept. no. 103 on Contract AT(30-1)-2262. 20 Aug 62, 21p. 3 refs.

GAMD-1961 $1.10

General Atomic Div., General Dynamics Corp., San Diego, Calif.
A SMALL NEUTRON BEAM CHOPPER, by W. L. Whittemore. Rept. on Contract AT(04-3)-167. 18 Jan 61, 7p.

HW-SA-2126 $1.10

Hanford [Atomic Products] Operation, Richland, Wash.
AN AUTOMATIC MONITORING STATION FOR THE COLUMBIA RIVER, by T. C. Mehas. 31 Jan 61, 9p.

HW-71142 $1.60

Hanford Atomic Products Operation, Richland, Wash.
NEUTRON FLUX MONITOR DETECTOR, by R. L. Richardson. Rept. on Contract AT(45-1)-1350. 22 Sep 61, 12p.

HW-SA-1912 $1.60

Hanford Atomic Products Operation, Richland, Wash.
REDOX INSTRUMENT MAINTENANCE WORKLOAD, by A. C. Morgenthaler. 3 Mar 60, 12p.

HW-SA-2032 $2.60

Hanford [Atomic Products] Operation, Richland, Wash.
SOME STUDIES OF FILM DOSIMETER VARIABLES, by W. V. Baumgartner. Rept. on Contract AT(45-1)-1350. June 60, 29p. 11 refs.

UCRL-9632 $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
CYCLOTRONS, by Bob H. Smith. Rept. on Contract W-7405-eng-48. 4 Apr 61, 8p.

UCRL-9529 $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
ELECTRICAL LIMITATIONS TO ENERGY RESOLUTION IN SEMICONDUCTOR PARTICLE DETECTORS, by William L. Hansen and Frederick S. Goulding. Rept. on Contract W-7405-eng-48. 5 Apr 61, 18p. 2 refs.

UCRL-9624 $2.60

Lawrence Radiation Lab., U. of California, Berkeley.
FAST PULSE-AMPLITUDE DISCRIMINATORS, by Dick A. Mack. Rept. on Contract W-7405-eng-48. 30 Mar 61, 24p. 17 refs.

UCRL-6264 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
NEUTRON ENERGY MEASUREMENTS BY AN ATTENUATION TECHNIQUE, by Seymour Block and Frederick J. Shon. Rept. on Contract W-7405-eng-48. Dec 60, 17p. 7 refs.

UCRL-6810 $4.60

Lawrence Radiation Lab., U. of California, Livermore.
PERFORMANCE TESTS AND LIFE DATA OF THE 36-MEGAWATT MODULATORS DEVELOPED FOR THE ASTRON 1000-MEGAWATT ELECTRON ACCELERATOR, by Vernon L. Smith. Rept. on Contract W-7405-eng-48. 24 July 62, 42p. 14 refs.

UCRL-5962-T $2.60

Lawrence Radiation Lab., U. of California, Livermore.
THE USE OF TRANSISTORS IN HIGH SPEED TIME-TO-HEIGHT CONVERTERS, by Richard P. Rufer. Rept. on Contract W-7405-eng-48. Apr 60, 22p.

PB 162 306-14 $1.60

Metal Hydrides, Inc., Beverly, Mass.
GAMMA RAY SENSITIVE ALKALI HALIDE CRYSTALS, by M. D. Banus. Interim development rept. no. 14, 24 July-24 Aug 52, on Contract NObsr-52428. 29 Aug 52, declassified 27 July 57. 18p. AD-11 802.

DESCRIPTORS: *Alkali metal compounds, Halides, *Potassium compounds, Bromides, Hydrides, Crystallization, Analysis, Deterioration, *Plastics, *Radiation effects, *Dosimeters, Crystals, *Gamma rays.

Active KBr samples were prepared with sensitivities of 50 to 75 r. Crystals of good size for irradiation vials were separated out with sieves in preference to hand picking. The data on deterioration of the samples showed that sensitive KBr had local areas of supersaturation with KH. An opaque spot was formed when KH precipitated; the area was sensitive to light and turned blue on exposure. The bluing was attributed to traces of UV. The use of Selectron no. 5003 with a polymerization catalyst of 1% Lupersol DDM and 0.5% Naugatuck no. 1 was the most promising for potting alkali halide crystals; however, after storage the plastic gradually separated from the crystals.

PB 162 308 $5.60

Metal Hydrides, Inc., Beverly, Mass.
GAMMA RAY SENSITIVE ALKALI HALIDE CRYSTALS, by M. D. Banus. Final rept. 23 May 51-23 Sep 52, on Contract NObsr-52428. 15 Nov 52, declassified 19 Nov 57, 51p. AD-4649.

DESCRIPTORS: *Dosimeters, *Alkali metal compounds, Halides, *Potassium compounds, Bromides, Hydrides, Crystallization, Analysis, Deterioration, *Plastics, Liquids, Powders, Radiation effects, Crystals, Gamma rays, Sensitivity.

The purpose of this research and development is to select, develop and produce prototype samples of alkali halide materials which are sensitive to X and gamma radiation over the range from 0.08 to 1.5 Mev. This sensitivity is indicated by a color change of the material after exposure to radiation, the color change being observable by the unaided eye. The alkali halide material may be in the form of a crystal or a powder, varying in size. Samples of various sensitized materials have been submitted to the Bureau of Ships for study and evaluation. This research and development work also included an investigation into the production techniques and facilities required to produce the desired material on a large scale, and to make recommendations as to the practicability of producing such sensitive materials commercially. (See also PB 162 306-14)

Y-676 $7.60

Oak Ridge National Lab., Tenn.
ELECTROMAGNETIC RESEARCH DIVISION. Progress rept. 1 July-1 Oct 50, on Contract W-7405-eng-26. 12 Oct 50, declassified 5 Apr 62. 73p.

Y-795 $5.60

Oak Ridge National Lab., Tenn.
ELECTROMAGNETIC RESEARCH DIVISION. Progress rept. 1 Apr-30 June 51, on Contract W-7405-eng-26. 16 July 51, declassified 2 Apr 62. 10 refs.

ORNL-1345 $2.60

Oak Ridge National Lab., Tenn.
ELECTROMAGNETIC RESEARCH DIVISION, ed. by F. T. Howard. Quarterly progress rept. part 1, for period ending 30 June 52, on Contract W-7405-eng-26. declassified 2 Apr 62. 24p. 3 refs.

ORNL-TM-330 $1.60

Oak Ridge National Lab., Tenn.
A TRANSISTORIZED ALPHA COUNTER FOR AN ALPHA GAUGE, by M. C. Kopp. 23 Aug 62, 12p. 6 refs.

TID-16345 $7.60

Vanderbilt U., Nashville, Tenn.
A FAST COINCIDENCE SINGLE-CHANNEL SPECTROMETER, by John R. Mann. Master's thesis, June 62, 71p. 26 refs.

Nuclear Engineering

AGN-TM-374 $4.60

Aerojet-General Nucleonics, San Ramon, Calif.
EVALUATION OF A URANIUM-GLASS FUEL SYSTEM FOR THE GCRE, by P. F. Young. Rept. on Contract AT(10-1)-880. July 62, 46p. 30 refs.

AGN-TM-386 $5.60

Aerojet-General Nucleonics, San Ramon, Calif.
TUBE BUNDLE REPLACEMENT IN THE GAS-COOLED REACTOR EXPERIMENT, by R. H. Chesworth and J. M. Janis. Rept. on Contract AT(10-1)-880. Sep 60, 51p.

APAE-Memo-322 $5.60

Alco Products, Inc., Schenectady, N. Y.
CORRELATION OF CRITICAL MASS DATA ON LIGHT WATER MODERATED, FULLY ENRICHED URANIUM, STAINLESS STEEL REACTORS, PART I, by D. H. Lee. Rept. on Contract AT(30-1)-2639. 17 July 62, 60p. 43 refs.

APAE-Memo-321 $3.60

Alco Products, Inc., Schenectady, N. Y.
DETAILED STRESS ANALYSIS OF PM-2A STEAM GENERATOR TUBE SHEET, by J. J. Busuttil. Rept. on Contract AT(30-1)-2639. 20 July 62, 34p. 5 refs.

APAE-Memo-319 $3.60

Alco Products, Inc., Schenectady, N. Y.
DETAILED STRESS ANALYSIS OF SM-1 STEAM GENERATOR TUBE SHEET, by J. J. Busuttil and R. A. Chittum. Rept. on Contract AT(30-1)-2639. 11 July 62, 40p. 6 refs.

APAE-Memo-318 $5.60

Alco Products, Inc., Schenectady, N. Y.
MATHEMATICAL ANALYSIS OF RIPPLING OF TYPE 1 FUEL PLATES, PART I, by S. D. Beck and J. V. Miller. Rept. on Contract AT(30-1)-2639. 5 July 62, 56p. 19 refs.

APAE-119 $10.50

Alco Products, Inc., Schenectady, N.Y.
POWER DISTRIBUTIONS, FOR TYPE 3 REPLACEMENT CORES FOR SM-1, SM-1A AND PM-2A, by J.P. Oggerino. Rept. on Contract AT(30-1)-2639. 25 July 62, 144p. 15 refs.

APAE-Memo-311(Rev. 1) $9.60

Alco Products, Inc., Schenectady, N.Y.
SPECIFICATIONS AND FABRICATION PROCEDURES FOR TYPE 3 FUEL ELEMENTS, by E.C. Edgar and H.R. Clayton. Rept. on Contract AT(30-1)-2639. 27 Apr 62, 124p.

APAE-Memo-312 $5.60

Alco Products, Inc., Schenectady, N. Y.
SPECIFICATIONS AND FABRICATION PROCEDURES FOR TYPE 3 NEUTRON ABSORBER SECTIONS, by E. C. Edgar and H. R. Clayton. Rept. on Contract AT(30-1)-2639. 25 Apr 62, 59p.

APAE-122 $8.10

Alco Products, Inc., Schenectady, N. Y.
TEST PROGRAM FOR 30 MEGAWATT PROTOTYPE SODIUM INTERMEDIATE HEAT EXCHANGER AND STEAM GENERATOR. Rept. on Contract AT(11-1)-666. 14 Sep 62, 90p.

ACNP-62020 $3.60

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
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IMPROVED ZIRCONIUM ALLOYS, by D. Weinstein and F. C. Holtz. Progress rept. 1 Feb 61-28 Feb 62, on Contract AT(11-1)-578. 28 Feb 62, 23p. 7 refs.

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Atomic Energy Commission. Div. of Operations Analysis and Forecasting, Washington, D. C.
A SURVEY OF THORIUM REACTOR TECHNOLOGY, by Paul Hogroian. Aug 62, 35p. 37 refs. OA:R-28.

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Atomics International, Canoga Park, Calif.
THE STEADY STATE STRUCTURAL EVALUATION OF THREE HIGH TEMPERATURE-HIGH PRESSURE SODIUM GENERATOR DESIGNS, by R. M. Galantine and F. J. Waters. Rept. on Contract AT(11-1)-Gen-8. 30 Apr 61, 42p. 6 refs.

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Babcock and Wilcox Co., Lynchburg, Va.
PRELIMINARY HAZARDS SUMMARY REPORT. BABCOCK AND WILCOX TEST REACTOR. July 62, 235p.

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MANUALLY OPERATED REACTOR COOLANT LOOP STOP VALUE TEST. Rept. on Contract AT(11-1)-GEN-14. 31 May 62, 7p. DLCS-39501.

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CEND-108 $4.60

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REACTOR THEORY DEVELOPMENT PROGRAM FOR ABWR, by E. A. Newburg and L. C. Noderer. Annual progress rept. 1 Oct 59-30 Sep 60, on Contract AT(10-1)-967. 42p. 26 refs. IDO-19022.

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Army Signal Research and Development Lab., Fort Monmouth, N. J.
PROCEEDINGS OF THE ANNUAL SYMPOSIUM ON FREQUENCY CONTROL (NO. 16), 25, 26, 27 APRIL 1962, SHELBOURNE HOTEL, ATLANTIC CITY, NEW JERSEY. [1962]. 489p. 138 refs.

DESCRIPTORS: Frequency, Control, Conference, *Piezoelectric crystals, Radiation effects, Resonance, Friction, Microwaves, Acoustics, Yttrium, Iron, Garnets, Vibrators, Measurement, Quartz, Aging, Crystal holders, Glass, Ceramic materials, *Crystal filters, *Miniature electronic equipment, Very low frequency, Synchronizers, Sattelite vehicle research, *Masers, Molecular spectroscopy, *Oscillators, Diodes, Thermoelectricity, Temperature control, Nickel electrodes, Cathodes.
Contents:
Piezoelectric crystals
Piezoelectric crystals and measurements
Special topics
Atomic and molecular resonance
Atomic and molecular resonance and related topics
Circuitry.

BNL-5120 $6.60

Brookhaven National Lab., Upton, N. Y.
RADIATION HARDENING, by George H. Vineyard. Oct 60, 64p. 47 refs.

TID-16488 $2.60

Cornell U., Ithaca, N. Y.
ATOMIC DISPLACEMENTS IN METALLIC SOLID SOLUTIONS, by W. W. Webb. 27 Aug 62, 29p. 40 refs.

PB 162 262 $2.60

Eagle-Picher [Research Labs.] Joplin, Mo.
PREPARATION OF HIGH PURITY GERMANIUM BY THE DIRECT REDUCTION OF GERMANIUM TETRACHLORIDE (RELATED WORK ON THE CONTROLLED ADDITION OF P-TYPE AND N-TYPE IMPURITY ATOMS), by Robert K. Riel. Quarterly rept. no. 12 (Final), 1 Feb-1 May 54, on Contract DA 36-039-sc-5562. 2 June 54, 28p. 6 refs. AD-43 175.

DESCRIPTORS: *Germanium compounds, *Chlorides, Reduction, *Germanium, Crystals, Single crystals, Production, Purification, Impurities, Electrical properties.

Polycrystalline samples containing 3 at. -% Si and grown at 3.75 in./hr had a room temperature resistivity of 3.59 ohm-cm and mobilities of 870 sq cm/vsec. Resistivity vs temperature plots yielded ΔE values of about 0.8 ev. X-ray powder patterns of this alloy had broad lines in the high Θ region. Single crystals containing 3 at. -% Si and grown at the rate of 0.172 and 0.3 in./hr had room temperature resistivities of 7 ohm-cm and E values of 0.789 ev. X-ray analysis indicated a lattice contraction of

0.151% or equivalent to about 3.45 at. -% Si. The lines were sharp and were from a different lattice than Ge.

NYO-10554 $4.60

Flow Corp., Cambridge, Mass.
GROWTH OF METAL SINGLE CRYSTALS AND THE PRODUCTION OF HIGH PURITY METALS. Final rept. on Contract AT(30-1)-2049. July 60, 43p. 6 refs.

IS-257 $2.60

Institute for Atomic Research, Iowa State U. of Science and Tech., Ames.
STRUCTURES OF THE INTERMEDIATE PHASES $Ni_{10}Zr_7$ AND $Ni_{10}Hf_7$, by M. E. Kirkpatrick, J. F. Smith, and W. L. Larsen. [1961] 24p. 10 refs.

TID-16275 $3.60

International Business Machines Corp., Yorktown Heights, N. Y.
DEFECTS IN METALLIC AND IONIC CRYSTALS, by A. S. Nowick. Annual rept., 15 May 61-15 May 62, on Contract AT(30-1)-2811. 32p. 7 refs.

AD-272 548 $8.10

Istituto Nazionale di Ultracustica, Rome (Italy).
INTERNAL FRICTION IN THE BODY-CENTERED CUBIC METALS NIOBIUM AND TANTALUM, by Piero G. Bordoni. Final technical rept. no. 1, 1 Nov 60-31 Oct 61, on Contract DA 91-591-EUC-1618. 1 Nov 61, 90p. 81 refs.

DESCRIPTORS: *Metallic crystals, Niobium, *Tantalum, Inturnac friction, Deformation, Lattices, Crystals, Crystal structure, Relaxation time, Electrons, Phonons, Electron transitions, Solid state physics, Physical properties, Tables, Temperature, Frequency.

Experimental data are presented which prove that the Nb and Ta dissipation peaks are due to thermally activated relaxation effects and there can be little doubt that the Mo and W peaks are also associated with a similar effect. Hence there is no longer a reason to reject Seeger's theory on the ground that it predicts relaxation effects both in the fcc and bcc metals. These data show that a close analogy exists between the relaxation effects in Nb and Ta and those found in fcc metals. The fundamental parameters (almost identical for Nb and Ta) were near those measured in fcc metals. The normalized dissipation curves for Nb and Ta are asymmetrical like those for fcc metals, and the dissipation peak is shifted by annealing towards the lower temperatures for both types of metals. This analogy obviously suggests that the structural model for the relaxation effect in Nb and Ta must also be similar to the explanation given for fcc metals.

TID-12303 $1.60

Laboratory of Atomic and Solid State Physics, Cornell U., Ithaca, N.Y.
ELECTRON SPIN RESONANCE IN NEUTRON IRRADIATED QUARTZ, by Robert H. Silsbee. [1961] 14p. 14 refs.

UCRL-6835-T $1.60

Lawrence Radiation Lab., U. of California, Livermore.
X-RAY DIFFRACTOMETRY ABOVE 2000°C, by Deane K. Smith, 16 Mar 62, 16p. 4 refs.

PB 162 317-4 $4.60

Linden Labs., Inc., State College, Pa.
STUDY OF THE DEGRADATION OF HIGH K CERAMIC DIELECTRICS, by W. R. Buessem, P. A. Marshall, Jr. and others. Quarterly rept. no. 4 on Contracts DA 36-039-sc-71190, continuation of Contract DA 36-039-sc-42679. 1 Apr 57, 47p. 4 refs. AD-162 526.

DESCRIPTORS: *Ceramic materials, *Dielectrics, *Titanium compounds, Oxides, Deterioration, Thermal stresses, Gravimetric analysis, Crystal structure.

TiO_2 is known as an n-type semiconductor. The oxygen/titanium ratio is slightly smaller than 2:1. Because of the importance of the oxygen deficit for the electrical properties, especially for the high temperature stability, the change in weight of TiO_2 as a function of oxygen pressure and temperature has been investigated by a gravimetric method. (Author)

TID-12660 $2.60

Los Alamos Scientific Lab., N. Mex.
ORDER AND MICROPHASES IN CeCd ~ 4.5 SOLID SOLUTIONS, by Guy R. B. Elliott and Joe Fred Lemons. 22p. 6 refs. LADC-4707.

MRC-182 $3.60

Materials Research Corp., Orangeburg, N. Y.
GRAIN-BOUNDARY SLIDING IN NON-METALLIC BI-CRYSTALS, by M. A. Adams and G. T. Murray. Final rept. on Contract AT(30-1)-2178. 31 Aug 60, 41p. 6 refs.

MRC-317 $1.10

Materials Research Corp., Orangeburg, N. Y.
IRON SINGLE CRYSTAL PREPARATION, by C. F. Malo, Jr. Quarterly letter rept. no. 1, 1 Apr-1 July 62, on Contract AT(30-1)-2980. 27 July 62, 10p. 6 refs.

TID-16486 $10.10

Materials Science Center, Cornell U., Ithaca, N.Y.
HIGH TEMPERATURE DIELECTRIC PROPERTIES OF NaCl TYPE CRYSTALS AT 1.25 CM, by George Calvin Smith. Rept. on Contract AT(30-1)-2471. June 62, 122p. 56 refs. Rept. no. 51.

TID-15143 $1.60

Massachusetts Inst. of Tech., Cambridge.
NEUTRON DIFFRACTION STUDIES OF LOW TEMPERATURE PARAMAGNETIC ALIGNMENT IN SOLIDS, by C. G. Shull. Progress rept., 1 June 61-1 Feb 62, on Contract AT(30-1)-2592. 26 Feb 62, 6p.

ORNL-TM-310 $1.10

Oak Ridge National Lab., Tenn.
X-RAY DIFFRACTION STUDY OF Cs_3ZrF_7, by G. D. Robbins and J. H. Burns. 7 Aug 62, 8p. 5 refs.

TID-16040 $1.60

Sandia Corp., Albuquerque, N. Mex.
MEASURED BEHAVIOR OF GAMMA-RAY PHOTOCONDUCTIVITY IN ORGANIC DIELECTRICS, by S. E. Harrison. Rept. on Contract AT(39-1)-789. June 62, 20p. 16 refs. SCDC-2685.

SCR-532 $3.60

Sandia Corp., Albuquerque, N. Mex.
RADIATION DAMAGE TO SEMICONDUCTOR DEVICES, by J. W. Easley. July 62, 35p. 29 refs.

GEAP-3743 $4.60

Vallecitos Atomic Lab. [Pleasanton] Calif.
RADIATION EFFECTS IN BORIDES. PART III. CRYSTALLOGRAPHIC CHANGES IN IRRADIATED BORIDES, by W. V. Cummings and W. L. Clark. Rept. on Contract AT(04-3)-189. 31 May 62, 48p. 7 refs.

Theoretical Physics

TID-14568 $1.60

Institute for Atomic Research, Iowa State U. of Science and Tech., Ames.
ANGULAR DISTRIBUTION OF RELATIVISTIC ATOMIC K-SHELL PHOTOELECTRONS, by T. A. Weber and C. J. Mullin [1961] 17p. 8 refs. (U. of Notre Dame).

UCRL-13045 $5.60

Lawrence Radiation Lab., U. of California, Livermore.
CALORIMETRIC STUDIES OF PLASMA HEATED BY ADIABATIC MAGNETIC COMPRESSION, by T. O. Passell. Final rept. on Subcontract 122. 31 Aug 61, 61p. 20 refs.

UCRL-6114 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
NONLINEAR DIFFUSION OF A MAGNETIC FIELD INTO A PLASMA, by Edward A. Soltysik. Rept. on Contract W-7405-eng-48. Aug 60, 14p. 2 refs.

UCRL-6705-T $5.60

Lawrence Radiation Lab., U. of California, Livermore.
SOME OBSERVATIONS OF PLASMA INSTABILITIES IN THE MIRROR MACHINE, by Richard F. Post. Rept. on Contract W-7405-eng-48. 18 June 62, 58p. 31 refs.

TID-11120 $1.10

Los Alamos Scientific Lab., N. Mex.
A VARIANT OF THE BETHE-GOLDSTONE EQUATION, by Walter B. Goad. 7p. 3 refs. LADC-4607.

TID-14434 $1.60

Microwave Lab., Stanford U., Calif.
STUDIES OF PLASMA OSCILLATIONS. Quarterly status rept. no. 7, 1 June-31 Aug 61, on Contract AT(04-3)-326. Oct 61, 16p. 9 refs. M. L. rept. no. 865.

Thermodynamics

NASA N62-16838 $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THERMODYNAMIC AND TRANSPORT PROPERTY CORRELATION FORMULAS FOR EQUILIBRIUM AIR FROM 1,000°K TO 15,000°K, by John R. Viegas and John T. Howe. Oct 62, 34p. 12 refs. NASA TN D-1429.

TID-16539 $2.60

Argonne National Lab., Ill.
HYDRODYNAMIC INSTABILITY AND THE CRITICAL HEAT FLUX OCCURRENCE IN FORCED CONVECTION VERTICAL BOILING CHANNELS, by R. J. Weatherhead. 10 Apr 62, 28p. 11 refs.

TID-16451 $2.60

Engineering Research Labs., Columbia U., New York.
BASIC EXPERIMENTAL STUDIES OF BOILING FLUID FLOW AND HEAT TRANSFER AT ELEVATED PRESSURES, by Bruce Matzner. Monthly progress rept. July 62, on Contract AT(30-3)-187. 31 July 62, 11p.

TID-16750 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
A BOILING MODEL. 21 Oct 60, 14p. 5 refs.

UCRL-6411 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
TEMPERATURE DISTRIBUTION IN A THIN-WALLED COMBUSTION CHAMBER, by Saul B. Gorski. Rept. on Contract W-7405-eng-48. 7 Apr 61, 18p. 3 refs.

TID-6638 $1.10

Worcester Polytechnic Inst., Mass.
THERMODYNAMICS OF NON-STOICHIOMETRIC SYSTEMS, by Robert C. Plumb and Joseph Boggio. [1962] 8p.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

HW-SA-2081 $1.10

Hanford Atomic Products Operation, Richland, Wash.
PHOTOMICROGRAPH, A BIG BUSINESS ON A SMALL SCALE, by T. K. Bierlein, B. Mastel, and E. C. Watts. Rept. on Contract AT(45-1)-1350. [1961] 11p.

Photographs will not reproduce.

SOCIAL SCIENCES

PB 162 320 $5.60

Bureau of Social Science Research, Inc., Washington, D. C.
DEATH AS A CRITERIA IN THE STUDY OF EXTREME CAPTIVITY SITUATIONS, by Albert D. Biderman. Rept. on Contract AF 49(638)727. Feb 61, 59p. 4 refs. BSSR Research rept. 339-3; AFOSR-253; AD-254 487.

DESCRIPTORS: *Survival, *War prisoners, Korea, Social sciences, Behavior, Privation, Stress (Physiology), Stress (Psychology).

Some questions raised in previous evaluations and interpretations of fatalities among American prisoners of war in Korea are examined by reference to studies of other historical cases of stressful captivity and by some reanalysis of Korean War data. The paper considers effects on survival of the following: individual and cultural concepts of survival requirements, modes of adaptation to privation, social background characteristics, and forms of prisoner organization. The adequacy of data and frequently employed theoretical formulations in which death is the criterion are also considered in relation to generalizations regarding these relationships. The paper is a preliminary effort in a larger study considering the relevance for the social sciences of knowledge developed by studies of extreme captivity situations. (Author)

SCR-527 $1.10

Sandia Corp., Albuquerque, N. Mex.
SCHEDULING SUPPLIER SURVEYS, by David L. Field. June 62, 8p.

Documentation

PB 162 342 $19.75

[Association of] S[pecial] L[ibraries and] Information] B[ureaux] Cranfield (Gt. Brit.).
REPORT ON THE TESTING AND ANALYSIS OF AN INVESTIGATION INTO THE COMPARATIVE EFFICIENCY OF INDEXING SYSTEMS, by Cyril W. Cleverdon. Rept. on Aslib-Cranfied Research Project. Oct 62, 318p. 128 refs.

DESCRIPTORS: *Library science, Documentation, *Indexes, Subject headings, Classification, Analysis, *Information retrieval

Four separate indexes were prepared, for which 18,000 documents were indexed by the Universal Decimal Classification, an alphabetical subject index, a special facet classification, and the Uniterm system of co-ordinate indexing. The major portion of the time spent on the first stage involved the analysis of the considerable amount of data which was obtained from the main test program. One difficulty was deciding on the type of analysis which would be most likely to yield valuable information. This volume presents selections from the analysis that was done; in many cases only brief examples are given. The major emphasis has been placed on the reasons for failure to retrieve source documents.

AD-275 393 repriced $4.00

Documentation, Inc., Washington, D. C.
THE STATE OF THE ART OF COORDINATE INDEXING, by Josephine J. Jaster, Barbara R. Murray, and Mortimer Taube. Rept. on Contract NSF-C-147. Preliminary ed. Feb 62, 259p. 218 refs.

DESCRIPTORS: *Indexes, *Information retrieval, *Subject headings, Classification, Information theory, Special functions, Theory, Bibliography, Vocabulary, Growth, Automation, Coding, Microfilm, Computers, Magnetic tape.

Coordinate indexing in this study is defined to include all systems in which the logical operation of intersection, union, and negation are brought into play in the manipulation of index terms. This therefore covers nearly every mechanized system. It includes both term-on-item and item-on-term systems. It excludes only those systems which are precoordinated, i. e., nonmanipulative. Whether systems use uniterms, keywords, descriptors, unit concepts, or structerms, they are included in this study. A distinction is made between pure and constrained systems, but not so as to eliminate the latter from the study. In the chapter on roles and links, although there is an attempt to distinguish among the various kinds of roles and links, none is omitted because it does not fit a particular definition. Each section has its own reference-footnotes. However, at the end of the report there is an annotated bibliography of the more significant papers that were published between 1947 and 1960. (Author)

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- Establishing a new business

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- Investment and trade opportunities abroad
- Economic conditions in foreign countries

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